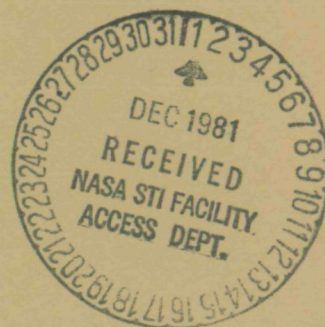




Aerospace Medicine
and Biology
A Continuing
Bibliography
with Indexes

NASA SP-7011 (224)
October 1981

National Aeronautics and
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Aerospace Medicine & Biology

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AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY WITH INDEXES

(Supplement 224)

A selection of annotated references to unclassified reports and journal articles that were introduced into the NASA scientific and technical information system and announced in September 1981 in

- *Scientific and Technical Aerospace Reports (STAR)*
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INTRODUCTION

This Supplement to *Aerospace Medicine and Biology* (NASA SP-7011) lists 127 reports, articles and other documents announced during September 1981 in *Scientific and Technical Aerospace Reports (STAR)* or in *International Aerospace Abstracts (IAA)*. The first issue of the bibliography was published in July 1964; since that time, monthly supplements have been issued.

In its subject coverage, *Aerospace Medicine and Biology* concentrates on the biological, physiological, psychological, and environmental effects to which man is subjected during and following simulated or actual flight in the earth's atmosphere or in interplanetary space. References describing similar effects of biological organisms of lower order are also included. Such related topics as sanitary problems, pharmacology, toxicology, safety and survival, life support systems, exobiology, and personnel factors receive appropriate attention. In general, emphasis is placed on applied research, but references to fundamental studies and theoretical principles related to experimental development also qualify for inclusion.

Each entry in the bibliography consists of a bibliographic citation accompanied in most cases by an abstract. The listing of the entries is arranged in two major sections: *IAA Entries* and *STAR Entries*, in that order. The citations, and abstracts when available, are reproduced exactly as they appeared originally in *IAA* or *STAR*, including the original accession numbers from the respective announcement journals. This procedure, which saves time and money, accounts for the slight variation in citation appearances.

Two indexes -- subject and personal author -- are included.

An annual index will be prepared at the end of the calendar year covering all documents listed in the 1981 Supplements.

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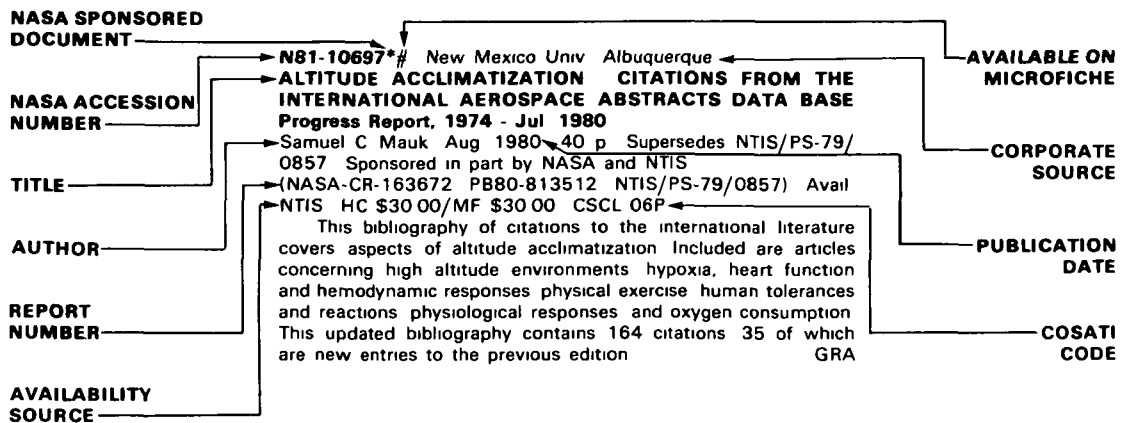
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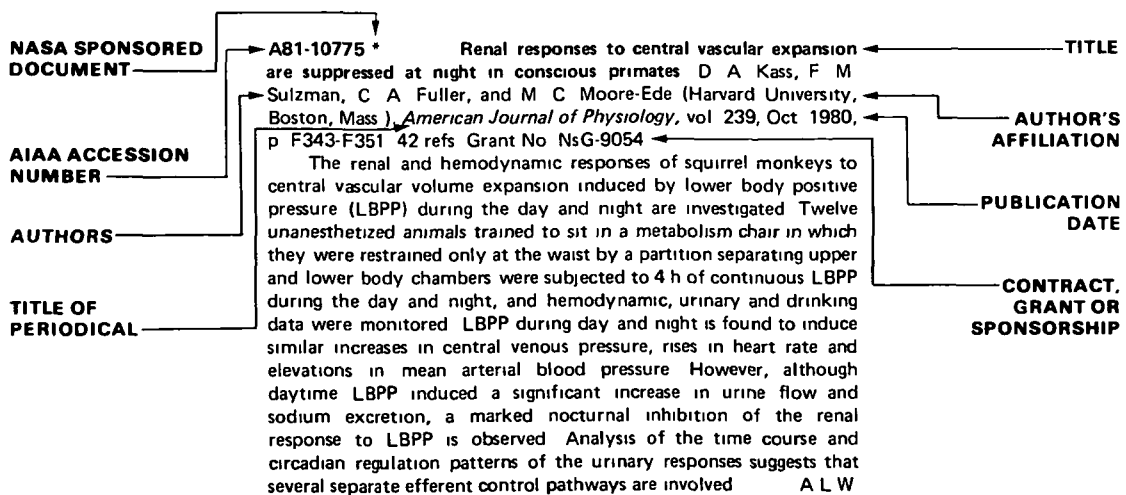
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AEROSPACE MEDICINE AND BIOLOGY

A Continuing Bibliography (Suppl. 224)

OCTOBER 1981

IAA ENTRIES

A81-37959 * A search for a nonbiological explanation of the Viking Labeled Release life detection experiment G V Levin and P A Straat (Biospherics, Inc, Rockville, MD) *Icarus*, vol 45, Feb 1981, p 494-516 42 refs Contracts No NASw-3162, No NASw-3249

The possibility of nonbiological reactions involving hydrogen peroxide being the source of the positive response detected by the Viking Labeled Release (LR) life detection experiment on the surface of Mars is assessed. Labeled release experiments were conducted in the LR Test Standards Module which replicates the Viking flight instrument configuration on analog Martian soils prepared to match the Viking inorganic analysis of Mars surface material to which an aqueous solution of hydrogen peroxide had been added. Getter experiments were also conducted to compare several reactions simultaneously in the presence and absence of UV radiation prior to the addition of nutrient. Hydrogen peroxide on certain analog soils is found to be capable of reproducing the kinetics and thermal information contained in the Mars data. The peroxide concentration necessary for this response, however, is shown to require a chemical stability or production rate much greater than seems likely in the Mars environment. As previous experiments have shown hydrogen peroxide to be the most likely nonbiological source of the positive LR response, it is concluded that the presence of a biological agent on Mars must not yet be ruled out. A L W

A81-38193 Personality and inter-subject differences in performance and physiological cost during whole-body vibration R D G Webb (University College, London, England), M D Bennett, B Farmilo (Royal Military College of Science, Shrivenham, Wilts, England), S H Cole, S J Page, and W R Withey (Army Personnel Research Establishment, Farnborough, Hants, England) *Ergonomics*, vol 24, Apr 1981, p 245-255 15 refs

The role of personality variables in determining individual differences in performance and physiological cost during whole-body vibration is investigated. Twelve subjects performed simultaneously a compensatory tracking task and a reaction time task during 10 min of vertical whole-body vibration at energy levels of 0.21, 0.28 and 0.35 g rms with sinusoidal and random waveforms and performance scores were compared to subject responses to a locus of control questionnaire, oxygen uptake and heart rate. Significant inter-subject differences in tracking error index are observed which are found to be correlated with subject scores on the locus of control test, with subjects exhibiting an external locus of control having the greatest tracking error index in each vibration condition. A high correlation is also observed between mean heart rate in all vibration conditions and locus of control score, with externally controlled subjects having the lowest heart rates. Results thus support the prediction that subjects reporting greater confidence in their own abilities to influence events (internal locus of control) would be more willing to expend effort in order to maintain performance during vibration. A L W

A81-38194 Variation in human response to whole-body vibration. D J Osborne, T O Heath, and P Boarer (Swansea,

University College, Swansea, Wales) *Ergonomics*, vol 24, Apr 1981, p 301-313 10 refs Research supported by the Social Science Research Council

Using the modified matching procedure described by Osborne and Humphreys (1976), individual sensation contours for vibration frequencies in the range 2.4 to 60 Hz were obtained from 100 subjects. In addition foot-head transmissibility ratios were obtained from each subject at each frequency, as well as EPI scores, and anthropometric data such as height, weight and chest circumference. A wide range of individual contour shapes was obtained, the distribution of shapes being slightly skewed towards a low linearity component. When all individual variables were included in a multiple regression analysis, however, they accounted for only 37% of the variability in linearity. Implications of these findings are discussed. (Author)

A81-38317 # Control of the horizontal motion of a walking machine in the case of incomplete information (Upravlenie gorizontalmym dvizheniem shagauushchego apparata pri nepolnoi informatsii) K I Naumenko (Akademiia Nauk Ukrainskoi SSR, Institut Matematiki, Kiev, Ukrainian SSR) *Matematicheskaya Fizika*, no 28, 1980, p 29-33 5 refs In Russian

The stochastic control of the horizontal motion of a walking machine is considered. A stabilization algorithm is developed, oriented towards the use of a linear feedback law. The solution of the stochastic control problem, formulated on the basis of the principle of stochastic equivalence, consists of two parts: optimal estimation of the system state vector on the basis of measurements, and the formation of a linear feedback law. According to this law, the control is a linear function of the optimal estimate of the state vector, given in the estimation formula for the Kalman filter. P T H

A81-38599 A power law for perceived contrast in human vision J Gottesman, G S Rubin, and G E Legge (Minnesota, University, Minneapolis, MN) *Vision Research*, vol 21, no 6, 1981, p 791-799 37 refs NSF Grant No BNS-77-22075, Grants No NIH-EY-02857, No NIH-T36-HD-07151, No NIH-HD-01136.

The dependence of perceived contrast on stimulus contrast of sine-wave gratings was measured by the method of magnitude estimation. The resulting perceived contrast functions are well described by threshold-corrected power functions with exponents near 0.7. The exponents are insensitive to changes in mean luminance from 10-340 cd/sq m, and to changes in spatial frequency from 0.25 to 12 c/deg. The exponents are also insensitive to a change in the range of grating contrasts from 1.2 log units. However, the distribution of contrast levels within the range produces small, but predictable, effects. Several factors are identified that may account for discrepancies in previous measurements of perceived contrast functions. (Author)

A81-38600 Interocular transfer of the motion after-effect is not reduced by binocular rivalry. R P O'Shea and B Crassini (Queensland, University, Brisbane, Australia). *Vision Research*, vol. 21, no 6, 1981, p 801-804 12 refs

Motion after-effects (MAEs) were measured intraocularly (adaptation, test stimuli to same eye) and interocularly (adaptation, test stimuli to opposite eye) when (1) a rival stimulus caused perceptual suppression of the adaptation stimulus, (2) no rival

stimulus was presented for the entire adaptation duration, and (3) non-rival adaptation was limited to the duration and adaptation stimulus was dominant in (1). Intraocular MAEs were greater than interocular MAEs, furthermore, both intraocular and interocular MAEs were similar following conditions (1) and (2), and reduced following (3). This pattern occurred with gratings of 1, 2 and 4 c/deg, but not 8 c/deg. Data are discussed in terms of mechanisms of rivalry and MAEs (Author)

A81-38667 Risks of radiation exposure and radiation protection standards A Brodsky and S McGuire (US Nuclear Regulatory Commission, Occupational Health Standards Branch, Washington, DC) *International Advances in Nondestructive Testing*, vol 7, 1981, p 13-30 28 refs

This paper compares the occupational radiation exposures received by industrial radiographers with radiation exposures from other natural and man-made sources. The risks from these exposures are discussed and found to be reasonably acceptable in comparison to other risks which we all face. Recent public claims by a few scientists that the risks are higher than has been generally believed are rejected. Some current NRC activities in the area of radiation protection standards for industrial radiography are mentioned (Author)

A81-38844 Perception of runway image shape and approach angle magnitude by pilots in simulated night landing approaches H W Mertens (FAA, Civil Aeromedical Institute, Oklahoma City, OK) *Aviation, Space, and Environmental Medicine*, vol 52, July 1981, p 373-386 30 refs

One cue for visual judgment of glidepath angle has been referred to as form ratio. Form ratio is defined as the ratio of vertical height of the runway to width of the far end in the runway retinal image. The ability of pilots to judge form ratios was compared with the ability to judge approach angles in the nighttime 'black hole' situation in two experiments. Responses in both static and dynamic simulated approach conditions indicated a general tendency to overestimate form ratios and approach angles less than 3 deg. Intersubject and intrasubject variability of form ratio and approach angle responses were comparable. These findings (1) do not support the utility of form ratio judgments as an aid in selecting approach angle, (2) add to the empirical evidence of visual illusions and the danger of reliance on visual information for judgment of approach angle in the nighttime 'black hole' situation where only runway lights are visible, and (3) point to variability in perception of approach angle as an important part of the problem (Author)

A81-38845 * Hemodynamic changes during whole body surface cooling and lower body negative pressure P B Raven (Texas College of Osteopathic Medicine, Fort Worth, Southwestern Medical School, Dallas, TX), G Pape, W F Taylor, F A Gaffney, and C G Blomqvist (Southwestern Medical School, Dallas, TX) *Aviation, Space, and Environmental Medicine*, vol 52, July 1981, p 387-391 15 refs. Research supported by the Harry S. Moss Heart Fund, Grant No. NSG-9026

Six young healthy male subjects were studied to evaluate the use of whole body surface cooling (WBSC) as an antithrostatic intervention. Previous studies have demonstrated that perfusion of an Apollo cooling garment with 16 C water produced a significant increase in stroke volume and decrease in heart rate at rest and during lower body negative pressure (LBNP). However, optimal perfusion temperatures have not been determined. The present study examined the effects of WBSC using perfusion of water at a temperature of 10 C. This perfusion temperature produced a greater decrease in mean skin temperature than water at 16 C (4 C drop compared to 2 C). The hemodynamic effects were also more prominent with 10 C water as shown by the increase in stroke volume of 11% at rest and of 35% during LBNP at -50 torr compared to control measurements at ambient temperature. Heart rates were lowered significantly (8 beats/min) and systolic arterial blood pressure was higher (8 torr). Cooling with 10 C water produced a slight increase in muscle tone, reflected by a small but significant increase (+84 ml/min) in oxygen uptake. These data suggest that WBSC is an effective nonpharmacologic means of controlling preload and deserves further investigation as an antithrostatic intervention (Author)

A81-38846 Influence of respiration on stroke volume determined by impedance cardiography B M Doerr, D S Miles, and M A B Frey (Wright State University, Dayton, OH) *Aviation, Space, and Environmental Medicine*, vol 52, July 1981, p 394-398 16 refs. Research supported by the American Heart Association

The influence of respiration on stroke volume, which is calculated independent of the baseline in seven healthy female subjects, ranging from 20-44 years of age is investigated, using impedance cardiography. The absolute values for stroke volume (SV), heart rate (HR), and cardiac output (Q), were posture-dependent and measurements were taken in the seated, supine and standing position. Results show that SVs did not differ among the respiratory phases in the standing and seated postures, but the smallest SV occurred at end-E on baseline. HR varied with respiration in both the steady and seated postures, but not in the supine posture. Despite significant changes in HR in the seated and standing postures, Qs did not differ among the respiratory phases. It is concluded that in reporting Q values for supine subjects, it is important to designate the respiratory phase and baseline criteria, while SVs calculated independent of the baseline generally agree with the more conventional method of calculation (E B)

A81-38847 Identifying borderline hypertensives - Comparative value of various blood pressure measurements D H Hull, R A Wolthuis, J R Fischer, J H Triebwasser, J T Curtis, and D A McAfoose (PARAF Hospital, Wroughton, Wilts, England, Medtronic, Inc., Minneapolis, MN, USAF, School of Aerospace Medicine, Brooks AFB, TX) *Aviation, Space, and Environmental Medicine*, vol 52, July 1981, p 399-403 23 refs

Ambulant male military aircrew patients (n = 299) were divided into two groups based on historic evidence of normotension (N) or of untreated borderline essential hypertension (BH). All patients had their blood pressure (BP) measured under various conditions and body positions. Results were analyzed to assess the capability of each BP measurement condition to assign patients correctly to their appropriate group. Clinical BP (physician-recorded with patient seated) and orthostatic stand BP (technician-recorded) showed best sensitivity and acceptable specificity. By incorporating the results of both these measurement conditions, a predictor approximating 90% for most BH and N patients was obtained. Use of these two measurements should enable recognition of most BH patients at a single evaluation (Author)

A81-38848 Radiation and G tolerance in rats J L Mattsson, R E Cordts, and R R Deyak, Jr (USAF, School of Aerospace Medicine, Brooks AFB, TX) *Aviation, Space, and Environmental Medicine*, vol 52, July 1981, p 404-407 12 refs

Male hooded rats were exposed to 2100 rad Co-60 radiation and 18 h later were exposed to +G acceleration until heart rate was reduced to 50% of baseline rate. G tolerance was 9.2% less in irradiated rats than in controls. Although small, this difference was significant at p less than 0.05. A similar group of rats was anesthetized 18 h postirradiation and carotid mean arterial pressures were measured. Mean arterial pressure was 122.1 torr for controls and 114.5 torr for irradiated rats. This difference was not significant (Author)

A81-38849 * A comparison of three liquid-ventilation cooling garments during treadmill exercise B Webbon, L Miller, B Williams (NASA, Ames Research Center, Moffett Field, CA), and L Montgomery (LDM Associates, San Jose, CA) *Aviation, Space, and Environmental Medicine*, vol 52, July 1981, p 408-415 14 refs

A comparative study was made of the heat transfer performance and physiological effects of three different cooling garments used under sealed garments (simulating space suits) on five male subjects, during treadmill exercise. The mean exercise metabolic rate while walking at 0.9 m/s (2 mph) was 464 plus or minus 33 W. An equilibrium condition was never reached during the uncooled suited control runs and the subjects lost approximately two percent of body weight during the exercises. The mean weight loss with an Apollo-type garment was 0.35 plus or minus 0.10 kg, and 0.26 plus or minus 0.11 kg with the full-body cooling patch garment (garment 2). With the partial-coverage cooling patch (garment 3), the weight loss was 0.52 plus or minus 0.12 kg. The data showed an increase in the leg blood flow when the working muscles were not cooled by liquid flow (garment 3), and the arm blood flow remained unchanged with and without liquid cooling to the arms (E B)

A81-38850 **The military aviator with renal stone disease**
D F Lynch, Jr (U S Navy, Naval Regional Medical Center, Portsmouth, VA) and W E Clayton (U S Navy, Naval Regional Medical Center, Oakland, CA) *Aviation, Space, and Environmental Medicine*, vol 52, July 1981, p 416-418 11 refs

Regulations currently in force governing the flight status of military aviators with urinary calculus disease are more restrictive than necessary and result in a substantial loss of aviation manpower. Those regulations and policies currently in force are reviewed, and more liberal guidelines, designed to provide for the safe return to useful flight status of aviation personnel with renal stone episodes, are proposed. (Author)

A81-38871 **Effect of training device on retention and transfer of a procedural task** S L Johnson (General Motors Institute, Flint, MI) *Human Factors*, vol 23, June 1981, p 257-272 15 refs Contract No F49620-77-C-0019

Three different training devices are investigated with respect to initial training, retention, and transfer of procedural task training. In the conventional practice strategy, the trainee repeatedly performs the task, making use of an interactive training device, which cues him to the sequential chaining of stimuli and responses. The reproduction practice strategy requires that the trainee reproduce the control actions and responses on a photograph of the device with a pencil. This method does not provide the spatial and temporal relationships that the conventional method does, but does require more recall memory, since calibrations and numerical values are not visible as cues. The blind practice strategy demands image memory capabilities, since it lacks both calibration cues and visible records of the trainee's actions. Results after testing with sixty subjects revealed that the blind strategy had a substantially greater total training and performing time than those with calibration cues, and had more setting errors, since the trainee could not see the previous settings and thereby reduce the number of alternatives available for future settings. The reproduction strategy proved best in the retention exercise, showing that training devices do not have to be of high fidelity to be effective in training procedural tasks. J F

A81-38872 **Flight display dynamics revisited** S N Roscoe, L Corl (New Mexico State University, Las Cruces, NM), and R S Jensen (Ohio State University, Columbus, OH) *Human Factors*, vol 23, June 1981, p 341-353 52 refs

Good old ideas for pictorial flight displays that were once impractical warrant reconsideration in light of current microcomputing and display technology. Among the ideas are the contact analog, highway in the sky, and flight path predictor concepts. Basic pictorial display principles established in the 1950s and 1960s have been supported by additional experimental findings in the 1970s. These include pictorial realism, magnification, integration, compatible motion, frequency separation, pursuit presentation, quickening, and predicting. An extended analysis of dynamic display variables provides a broadened conceptual foundation for future multifactor experimental optimization of forward-looking pictorial flight displays. (Author)

A81-38873 * **Prediction and quickening in perspective flight displays for curved landing approaches** R S Jensen (Ohio State University, Columbus, OH) *Human Factors*, vol 23, June 1981, p 355-363 8 refs NASA-sponsored research

In an empirical test of various prediction and quickening display algorithms, 18 professional pilot-subjects made four curved-path landing approaches in a GAT-2 simulator using each of 18 dynamically different display configurations in a within-subject design. Results indicate that second- and third-order predictor displays provide the best lateral performance. Intermediate levels of prediction and quickening provide best vertical control. Prediction quickening algorithms of increasing computational order significantly reduce aileron, rudder, and elevator control responses, reflecting successive reductions in cockpit work load. Whereas conventional crosspointer displays are not adequate for curved landing approaches, perspective displays with predictors and some vertical dimension quickening are highly effective. (Author)

A81-39246 # **Simulation of the pilot's long term strategy during IFR flights** D Soulatges (ONERA, Châtillon-sous-Bagneux,

Hauts-de-Seine, France) (*European Annual Conference on Decision and Manual Control, 1st, Delft, Netherlands, May 25-27, 1981*) *ONERA, TP* no 1981-43, 1981 14 p

A simplified aircraft dynamical model is presented for simulation of IFR flights, including a number of subsystems and their associated failure rates. Decisions are made by calling upon an IFR procedures list and, in addition, by falling back on after-failure procedures as set by the flight crew manual. The numerical application presented includes the homogeneous increase of failure rates for all systems, in order to provide an artificially augmented frequency of flights with failures, thereby inducing a wide variety of after-failure situations, including unexpected ones. Among the topics covered are wind vectors, control in the horizontal plane, vector calculations, navigation along a ground station axis, drift correction, vertical plane control and landing procedures. O C

A81-39396 **The ultimate resolution criterion for out-of-the-cockpit visual scene generation in real time** K S L Setty (Singer Co., Link Div., Binghamton, NY) In *Real-time signal processing III*, Proceedings of the Seminar, San Diego, CA, July 29, 30, 1980. Bellingham, WA, Society of Photo-Optical Instrumentation Engineers, 1980, p 61-69 9 refs

Visual system resolution, the first important criterion mentioned in functional specifications for the real time dynamic simulation of visual systems, is shown to have a great effect on the cost and complexity estimations of any dynamic visual system design with a very wide field of view. A description is given of what is essential in static and dynamic resolution of the simulated visual system for tactical combat mission pilot training, in the context of such relevant conjectures as the physical limits of computer processing, likely innovations in digital image processing, and the human brain's speed of visual information processing. It is concluded that a simple stress on realism in the visual simulations being developed may provide more information than is needed for effective training. O C

A81-39429 **Optical and electro-optical devices in tactical reconnaissance - Some human factors issues** J A Fitzgerald (McDonnell Douglas Astronautics Co., St Louis, MO) In *Long focal length, high altitude standoff reconnaissance*, Proceedings of the Seminar, San Diego, CA, July 29, 30, 1980. Bellingham, WA, Society of Photo-Optical Instrumentation Engineers, 1980, p 101-107 6 refs

Long focal length devices, both optical and electro-optical, will have an important position in the sensor suite of future tactical reconnaissance aircraft. Careful attention must be paid to aircrew capabilities and needs during system design and integration if these devices are to be fully exploited. Man/machine function allocation and aircrew needs with respect to information and control requirements are particularly critical. The sensitivity of system performance to design decisions related to these issues is discussed. (Author)

A81-39676 **Motion sickness and sensory illusions - Effects of rotations around horizontal axis (Mal des transports et illusions sensorielles - L'effet de rotations autour de l'axe horizontal)** A Leger (Centre d'Essais en Vol, Laboratoire de Médecine Aérospatiale, Bretigny-sur-Orge, Essonne, France), K E Money, R S Cheung, and J P Landolt (Defence and Civil Institute of Environmental Medicine, Downsview, Ontario, Canada) *Médecine Aérospatiale et Spatiale, Médecine Subaquatique et Hyperbare*, vol 20, 1st Quarter, 1981, p 11-17 21 refs In French

Experiments tested constant speed rotations about horizontal axes. Motion about axis (Z) running lengthwise on body was known to produce motion syndrome and sensory illusions as to movement and position due to constant reorientation of the gravity vector and its effects on body sensors. This type of rotation was tested for axes X, Y, Z utilizing fourteen subjects and a Precision Angular Mover apparatus. It was determined that vertigo and sensory illusions occur for motion about all axes. This type of simulation could be useful for selection of astronauts in terms of tolerance to atypical gravito-inertial environments. Other factors such as effects of visual conditions deserve further study. D B

A81-39677 A study of low frequency vibrations transmitted across an anthropomorphic mannequin and a human subject (Etude des vibrations de basse fréquence transmises à travers un mannequin anthropomorphique et le sujet humain) J L Poirier and B Vettes *Médecine Aéronautique et Spatiale, Médecine Subaquatique et Hyperbare*, vol 20, 1st Quarter, 1981, p 21-24 In French

A comparison is presented for transmission of low frequency vibrations from part to part in a mannequin and in human subjects. The mannequin and ten human subjects were each wired in three places with piezoresistive accelerometers, seated in an uncushioned helicopter chair, and subjected to vertical vibrations at 2 to 30 Hz, with at least 10 seconds stability at each vibratory level. Frequencies recorded were compared for rapport between head/thorax, thorax/spine, and head/spine, and it was found that while transmittance remained constant from part to part in humans, the mannequins exhibited enhanced vibration transmission during acceleration. It was concluded that a direct transfer of results from tests with mannequins to human beings is not now possible. D H K

A81-39678 Observations on inner ear and pressure variations (Oreille interne et variations de pression généralités) H Lienhart (Ministère des Armées, Service de Santé, Paris, France) and P Blanc (Centre Principal d'Expertise Médicale du Personnel Navigant, Paris, France) *Médecine Aéronautique et Spatiale, Médecine Subaquatique et Hyperbare*, vol 20, 1st Quarter, 1981, p 24-26 8 refs In French

Pressure variations may have a harmful effect on the ear and especially inner ear and the effects of barometrically-induced pressure variations during flight or underwater diving are considered. Most inner ear accidents due to pressure variations occur in underwater diving and are less frequent in flight situations. But middle ear accidents due to sudden pressure variations may occur during flight and there is a possibility of air-embolism in high-performance interceptors or high-altitude bombers. Chronic ear disorders affecting aviators include barotraumatic deafness due to repeated flights and landings and pressure variations in the cabins of some aircraft. Dangers include vertigo during undersea diving or flight. D B

A81-39679 Cardiac rhythm disturbances observed during the Apollo and Skylab programs (Troubles du rythme cardiaque observés dans les programmes Apollo et Skylab) G Leguay, A Seigneure, and M Chabierski (Hôpital d'Instruction des Armées Dominique Larrey, Versailles, France) *Médecine Aéronautique et Spatiale, Médecine Subaquatique et Hyperbare*, vol 20, 1st Quarter, 1981, p 27-30 7 refs In French

Because further space missions will accentuate scientific ability over physical stamina, a review of data concerning cardiac arrhythmia gathered during the NASA Apollo and Skylab programs was made. ECG tracings showed ventricular extrasystole events for all astronauts on Skylab flights II to IV, plus junctional rhythms and two short episodes of auriculo-ventricular dissociation. A 7.3 percent potassium loss was noted for the Apollo XV astronauts, a condition which dietary supplements eliminated for the Skylab crews. A decrease in catecholamines exists for all astronauts after spaceflight, and vagal hypertonus was often observed following stressful periods, when arrhythmia was coincident. An analogy is proposed for liquid movement from the lower body to the head during stress, when the vagus nerve acts to reduce arterial tension. It is concluded that vagal hypertonus may actually be beneficial, and the significance of many ECG recordings for different cardiac waves needs further study. D H K

A81-39681 A contribution to the causal study of air accidents - A method for testing for medicinal substances in biologic samples (Contribution à l'étude causale des accidents aériens - Une méthode de recherche des substances médicamenteuses dans les prélèvements biologiques) J P Delcroix and P E Picart (Centre d'Etudes et de Recherches de Médecine Aérospatiale, Paris, France) *Médecine Aéronautique et Spatiale, Médecine Subaquatique et Hyperbare*, vol 20, 1st Quarter, 1981, p 36-39 In French

A review is presented of detection methods currently used to find and identify medicinal substances in biological samples from flight personnel, noting the necessity of extending the range from narcotics to alcohol and carboxyhemoglobin. Because certain tissue

samples are difficult to obtain preflight and impossible to acquire post accident, especially for combat pilots, blood and sanguineous fluids, including saliva, are chosen as the best preflight samples. Centrifugation or dehydration followed by organic solvent purification using 2 to 5 ml of blood or other bodily liquid is considered sufficient for discovering neutralized, acid, and weakly or strongly basic drugs. Chromatography of extracts allows detection down to 100 ng levels, spectrometry allows detection of substances with a low molecular weight, and mass spectrometry in conjunction with chromatography of solids yields absolute identification down to 10 pg, using ionized fragments in a magnetic field at 1/10,000 torr. An example is provided for detection of caffeine in the blood of an air accident victim. D H K

A81-39682 Cardiovascular aspects of sustained intense acceleration (Aspects cardiovasculaires des accélérations de forte intensité et de longue durée) B Vettes (Centre d'Essais en Vol, Laboratoire de Médecine Aérospatiale, Bretigny-sur-Orge, Essonne, France) *Médecine Aéronautique et Spatiale, Médecine Subaquatique et Hyperbare*, vol 20, 1st Quarter, 1981, p 39-42 9 refs In French

It is noted that the new generation of fighter aircraft capable of intense sustained acceleration has led to the appearance of, besides various lesions and cramps in body extremities, endocardial hemorrhages and cardiomyopathy. Results are presented from centrifugal trials with 15 human subjects from the point of view of pilot selection and materials for their protection. Acceleration ranged from 3 to 5 g for 10 seconds to several minutes, rising quickly to simulate catapult launch. Subjects were monitored on an ECG, for blood pressure, heart rate, and systolic rejection volume. Type MORITZ 2 sinoventricular arrhythmia and tachycardia appeared after 3 g and systolic pressure dropped from 30 to 40 percent at 3 g to 55 percent at 5 g, which also induced average or higher nodal extrasystole. Lowered systolic ejection volume is attributed to bad systolic refilling due to tachycardia. Bigeminal ventricular extra-systole was found directly correlated with acceleration, and systolic and diastolic pressures were considered as adaptations to maintain adequate blood supply. Wearing anti-g pants was found to inhibit rapid heart beat. D H K

A81-39683 Betablocking collyrium and glaucoma in relation to aviators (Collyre bêta-bloquant et glaucome chez l'aviateur) J P Chevaleraud (Ecole d'Application du Service de Santé pour l'Armée de l'Air, Paris, France) *Médecine Aéronautique et Spatiale, Médecine Subaquatique et Hyperbare*, vol 20, 1st Quarter, 1981, p 43, 44 15 refs In French

Wide-angle glaucoma in aviators is not more frequent than in other groups but requires special therapeutic attention. Recent use of timolol maleate in collyrium form (1976) has had good results but the treatment can have side effects. Undesirable side effects were detected in almost one fourth of those treated including central nervous system disturbances and cardiovascular effects with slowing of pulse in 50 percent of patients. Also a drop in blood pressure, respiratory difficulties and transitory gastrointestinal problems are found. The most important side effect is decreased ocular tonus. Aviators should not fly at beginning of treatment, doses should be carefully scheduled, treatment should terminate if cardiac frequency or blood pressure drops and bradycardia should be an indication to stop treatment. Betablockers should be prescribed with care for aviators because side effects are not fully understood. D B

A81-39685 Diagnosis of microscopic hematurias in air crews (Diagnostic des hématuries microscopiques chez le personnel navigant) J Pasquet, J Lavernhe, and E Lafontaine (Compagnie Nationale Air France, Paris, France) *Médecine Aéronautique et Spatiale, Médecine Subaquatique et Hyperbare*, vol 20, 1st Quarter, 1981, p 56, 57 In French

It is important to make systematic urine tests during periodic aptitude examinations of air crews and a simplified Addis test was developed for this purpose. The presence of microscopic hematurias has an important diagnostic value. Its four main causes are infection, calculi, malformations and tumors. Hematurias may indicate nephro-urological disorders and complete or temporary inaptitude for flight duty. However, flight conditions are known to favor microcrystalluria and lithiasis and in this case the personnel should consume additional water during flight so as to avoid complications. D B

A81-39885 * Life on Mars G A Soffen (NASA, Washington, DC) In The new solar system Cambridge, Cambridge University Press, Cambridge, MA, Sky Publishing Corp., 1981, p 93-96, 215, 216 6 refs

The Viking biology experiments are examined It is noted that the Viking missions did not find a terrestrial type of life at either of the two landing sites This evidence may suggest that Mars is lifeless, but science demands a more rigorous proof, thus, it is still not known whether life exists on Mars It is suggested that the Martian polar regions must be explored before a conclusive answer is possible, the permanent polar caps of Mars are frozen water and would act as a 'cold finger' of the planet to trap organic molecules B J

A81-39916 Perception, comfort and performance criteria for human beings exposed to whole body pure yaw vibration and vibration containing yaw and translational components A W Irwin (Heriot-Watt University, Edinburgh, Scotland) *Journal of Sound and Vibration*, vol 76, June 22, 1981, p 481-497 21 refs

Human perception thresholds, in both the presence and the absence of visual cues, and equal sensation contours for low frequency whole body pure yaw vibration were investigated The results from these and other laboratory tests were combined with field test data for the human response to predominantly yaw vibration, caused by rotational oscillations of civil structures about a vertical axis of the human subjects, to provide guidelines for probable human response to pure yaw vibration at different levels in a variety of circumstances Relationships have also been derived to allow assessment of the probable responses of occupants of fixed structures to motion which exposes them to the more common case of simultaneous yaw and horizontal translational components of vibration (Author)

A81-40094 Effects of whole-body vibrations on perception and control of posture and movement G M Gauthier, J P Roll, B Martin, and M Hugon (Aix-Marseille I, Université, Marseille, France) In European Rotorcraft and Powered Lift Aircraft Forum, 6th, Bristol, England, September 16-19, 1980, Conference Papers Part 1 Bristol, University of Bristol, 1980 15 p 17 refs

The extent of postural and movement control alterations due to vibrations having frequency and amplitude similar to those encountered in cruising helicopters is defined The selective application of vibrations to various parts of the body in laboratory controlled conditions allowed the identification of the muscular proprioception system as the major site of stimulus action Electrically and mechanically induced spinal reflexes were analyzed during and after vibrations applied to subjects, and were found to be severely depressed These effects outlasted the duration of the vibrations Tests were conducted on standing and seated subjects at 18 Hz and plus or minus 0.2 to 0.5 g by means of a hydraulic jack O C

A81-40200 * The estimation of genetic divergence R Holmquist and T Conroy (California, University, Berkeley, CA) *Journal of Molecular Evolution*, vol 17, June 1981, p 167-181 40 refs NSF Grant No PCM-76-18627, Grant No NGR-05-003-460

Consideration is given to the criticism of Nei and Tateno (1978) of the REH (random evolutionary hits) theory of genetic divergence in nucleic acids and proteins, and to their proposed alternative estimator of total fixed mutations designated X2 It is argued that the assumption of nonuniform amino acid or nucleotide substitution will necessarily increase REH estimates relative to those made for a model where each locus has an equal likelihood of fixing mutations, thus the resulting value will not be an overestimation The relative values of X2 and measures calculated on the basis of the PAM and REH theories for the number of nucleotide substitutions necessary to explain a given number of observed amino acid differences between two homologous proteins are compared, and the smaller values of X2 are attributed to (1) a mathematical model based on the incorrect assumption that an entire structural gene is free to fix mutations and (2) the assumptions of different numbers of variable codons for the X2 and REH calculations Results of a repeat of the computer simulations of Nei and Tateno are presented which, in contrast to the original results, confirm the REH theory It is pointed

out that while a negative correlation is observed between estimations of the fixation intensity per varion and the number of varions for a given pair of sequences, the correlation between the two fixation intensities and varion numbers of two different pairs of sequences need not be negative Finally, REH theory is used to resolve a paradox concerning the high rate of covarian turnover and the nature of general function sites as permanent covarians A L W

A81-40295 Components of alveolar-arterial O2 gradient during rest and exercise at sea level and high altitude J T Sylvester, A Cymerman, G Gurtner, O Hottenstein, M Cote, and D Wolfe (Johns Hopkins Medical Institutions, Baltimore, MD, US Army, Research Institute of Environmental Medicine, Natick, MA) *Journal of Applied Physiology Respiratory, Environmental and Exercise Physiology*, vol 50, June 1981, p 1129-1139 50 refs

The contributions of pulmonary oxygen diffusing capacity, nonhomogeneity of the relationship between alveolar ventilation and perfusion, and the fraction of blood flowing through unventilated lung (shunt fraction) to the gradient in O2 partial pressure from the alveolar gas to arterial blood are investigated in the dog during rest and exercise at sea level and high altitude The relative importance of the alveolar-arterial O2 gradient components were evaluated based on measurements of the pulmonary exchange of O2, CO2 and six inert gases according to a three-compartment lung model consisting of a shunt compartment, a dead-space compartment, and an alveolar compartment Inert gas measurements reveal that shunt and dead-space fractions did not differ in sea level conditions and at a simulated altitude of 6096 m, while the ventilation/perfusion relationships became more homogeneous, accounting for the reduction in O2 gradient At sea level, the alveolar-arterial O2 gradient is found to be due primarily to ventilation/perfusion nonhomogeneities, with a small portion due to shunt At high altitude, the contribution of shunt became negligible and that of ventilation/perfusion nonhomogeneity diminished, however a gradient due to diffusion limitation was found Exercise was not found to have any effect on the alveolar-arterial O2 gradient or any of its components A L W

A81-40296 * Beat-by-beat stroke volume assessment by pulsed Doppler in upright and supine exercise J A Loeppky, E R Greene, D E Hoekenga, A Caprihan, and U C Luft (Lovelace Foundation for Medical Education and Research, Veterans Administration Medical Center, Albuquerque, NM) *Journal of Applied Physiology Respiratory, Environmental and Exercise Physiology*, vol 50, June 1981, p 1173-1182 32 refs Contract No NAS9-15483

The instantaneous stroke volume (SV) and cardiac output (Q) in eight male subjects during steady state supine (S) and upright (U) exercises at 300 kpm/min is assessed by a 3.0-MHz pulsed Doppler echocardiograph The mean transients in heart rate (HR), SV, and Q for each posture were determined and the center-line blood velocities obtained in the ascending aorta Results show that the mean supine values for SV and Q at rest and exercise were 111 ml and 6.4 l/min and 112 ml and 9.7 l/min, respectively The corresponding results for U were 76 ml and 5.6 l/min and 92 ml and 8.4 l/min, respectively The values compare favorably with previous studies utilizing invasive procedures The transient response of Q following the onset of exercise in U was about twice as fast as in S because of the rapid and almost immediate upsurge in SV The faster rise in aortic flow in U with exercise represented and additional volume (184 ml) of blood passing through the aorta compared with S in the first 20 exercises It is suggested that the rapid mobilization of pooled venous blood from the leg veins during U was responsible for the increased blood flow A L W

A81-40356 Life sciences and space research XIX, Proceedings of the Topical Meeting, Budapest, Hungary, June 2-14, 1980 Meeting sponsored by COSPAR Edited by W R Holmquist (California, University, Richmond, CA) *Advances in Space Research*, vol 1, no 14, 1981 238 p

Physical and chemical limits on life in the solar system are reviewed with emphasis on the effects of radiation and weightlessness on organisms. Papers are presented on the CO₂ greenhouse effect and the thermal history of the atmosphere, effects of salts and temperatures on post irradiation growth of *Penicillium* exposed to ultraviolet, effects of prolonged exposure to space flight factors for 175 days on lettuce seeds, and human adaptation to simulated gravitational fields. Other studies include gravity as an obligatory factor in normal higher plant growth and development, skeletal alterations in rats during space flight, and the role of weightlessness in the genetic damage from preflight gamma-irradiation of organisms in experiments aboard the Salyut 6 Orbital Station. V L

A81-40358 Biological studies of Martian soil analogues. A A Imshenetskiy, B G Murzakov, M D Evdokimova, and I K Dorofeeva (Akademiya Nauk SSSR, Institut Mikrobiologii, Moscow, USSR) (COSPAR, Topical Meeting on Life Sciences and Space Research XIX, Budapest, Hungary, June 2-14, 1980) *Advances in Space Research*, vol 1, no 14, 1981, p 21-26 11 refs

Results of the study of the influence of Martian soil analogs and of hydrogen peroxide on the viability of microorganisms are presented. The experiments were carried out using mixtures of soil analogs with desert soil and black earth (chernozem) samples, and pure cultures of microorganisms. Microorganisms capable of withstanding a concentration of hydrogen peroxide in the medium as high as 1.5-2.0% were isolated. None of the 40 strains of microorganisms studied, all belonging to different systematic and physiological groups, exhibited growth inhibition on solid media in the presence of Martian soil analogs. In view of the fact that Martian soil cannot contain microorganisms in great quantities, the use of electroadsorption for their concentration, to make detection reliable is suggested. A device was designed for this purpose, using the principle of electroadsorption on a polarizable carrier (sterile cotton wool or cheesecloth). The concentrated suspension of microorganisms thus obtained was then characterized by various physicochemical methods. (Author)

A81-40359 Enzyme-mimicking properties of silicates and other minerals. B Z Siegel and S M Siegel (Hawaii, University, Honolulu, HI) (COSPAR, Topical Meeting on Life Sciences and Space Research XIX, Budapest, Hungary, June 2-14, 1980) *Advances in Space Research*, vol 1, no 14, 1981, p 27-36 27 refs

The adsorptive and/or catalytic properties of clays, silicates in general, and other minerals are well known. More recently, their probable role in prebiotic syntheses of bio-organic compounds has become a matter of record. It is demonstrated that, in addition to their role in the de novo formation of important biomolecules, clays, micas, fibrous silicates and other minerals mimic the activities of contemporary enzymes including oxidases, esterases, phosphatases and glucosidases. The existence of such capabilities in substances likely to be represented on the surfaces of earth-like planets may offer a challenge to the technology and design of remote life detection systems which must then distinguish between bona fide biological chemistry and mineral-base pseudo-metabolism. It also raises questions about the importance of mineral surfaces in post-mortem transformations of organic metabolites in the earth biosphere. (Author)

A81-40360 Survival of microorganisms in space - A review. G Horneck (Deutsche Forschungs- und Versuchsanstalt für Luft- und Raumfahrt, Institut für Flugmedizin, Frankfurt am Main, West Germany) (COSPAR, Topical Meeting on Life Sciences and Space Research XIX, Budapest, Hungary, June 2-14, 1980) *Advances in Space Research*, vol 1, no 14, 1981, p 39-48 25 refs

Spores of *Bacillus subtilis* were exposed to selected factors of space (vacuum, solar UV radiation, heavy cosmic ray ions), and their response was studied after recovery. These investigations were supplemented by ground-based studies under a simulated space conditions. The vacuum of space did not inactivate the spores. However, vacuum-induced structural changes in the DNA, and

probably in the proteins, caused a supersensitivity to solar UV radiation. This phenomenon is caused by the production of specific photoproducts in DNA and protein, which cannot be removed by normal cellular repair processes. In vegetative bacterial cells exposed to vacuum, cell dehydration led to damage of the cell membrane, which could be partly repaired during subsequent incubation. The high local effectiveness of the heavy cosmic ray ions further decreases the chance that spores can survive for any length of time in space. Nonetheless, a spore travelling through space and protected from ultraviolet radiation could possibly survive an interplanetary journey. Such a situation favors panspermia as a possible explanation for the origin of life. (Author)

A81-40361 Effects of salts and temperatures on post-irradiation growth of *Penicillium* exposed to ultraviolet. R Valdez, B Z Siegel, and S M Siegel (Hawaii, University, Honolulu, HI) (COSPAR, Topical Meeting on Life Sciences and Space Research XIX, Budapest, Hungary, June 2-14, 1980) *Advances in Space Research*, vol 1, no 14, 1981, p 49-52 6 refs

The growth of *Penicillium notatum* colonies after UV irradiation of dried mycelium or spores was studied in relation to post-irradiation temperature and salt environment. Dried mycelium and spores behaved differently with respect to sensitivity to temperature, salts and UV, especially the latter. Threshold inhibitory doses for spores were modified markedly either at 4°C or in magnesium and calcium chlorides. It is suggested that these temperature and salt effects are related to prevention of photochemical membrane damage. (Author)

A81-40365 A review and comparative analysis of the biological damage induced during space flight by HZE particles and space hadrons. I G Akoev, S S Iurov, and B I Akoev (Akademiya Nauk SSSR, Institut Biofiziki, Pushchino, USSR) (COSPAR, Topical Meeting on Life Sciences and Space Research XIX, Budapest, Hungary, June 2-14, 1980) *Advances in Space Research*, vol 1, no 14, 1981, p 75-81 24 refs

The somatic and genetic effects of heavy ions (HZE particles) and the very high energy hadrons of space radiation on various organisms ranging in complexity from the bacteriophage to man have been studied. Experimental data were obtained in space, on high mountains in a proton accelerator at energies of 76 GeV. In all these experiments local micro- and macroradiational damage was observed. This damage was characterized by severity over large local regions and for the most part was due to cascades of secondary particle bundles resulting from the collision of very high energy space hadrons with atomic nuclei rather than from cellular hits from relatively low energy single HZE particles. At present there does not appear to be any effective way to provide shielding against these cosmic hadrons. (Author)

A81-40366 Effects of prolonged exposure to space flight factors for 175 days on lettuce seeds. L V Nevzgodina, E N Maximova, and Iu A Akatov (Ministerstvo Zdravookhraneniya SSSR, Institut Mediko-Biologicheskikh Problem, Moscow, USSR) (COSPAR, Topical Meeting on Life Sciences and Space Research XIX, Budapest, Hungary, June 2-14, 1980) *Advances in Space Research*, vol 1, no 14, 1981, p 83-85

The effects of prolonged (up to 175 days) exposure of *Lactuca sativa* seeds to space flight factors, including primary cosmic radiation heavy ions have been studied. The data obtained evidence a significant fourfold increase of spontaneous mutagenesis in seeds both with regard to the total number of aberrant cells as well as the formation of single cells with multiple aberrations. Comparison of the present experiment with earlier works shows that the frequency of such aberrations increases with the duration of the flight. (Author)

A81-40367 **Biological investigations aboard the biosatellite Cosmos-1129** M G Tairbekov, G P Parfenov, R W Platonova, V M Abramova, V K Golov, A V Rostopshina, V Iu Liubchenko, and V G Chuchkin (Ministerstvo Zdravookhraneniia SSSR, Institut Mediko-Biologicheskikh Problem, Moscow, USSR) (*COSPAR, Topical Meeting on Life Sciences and Space Research XIX, Budapest, Hungary, June 2-14, 1980*) *Advances in Space Research*, vol 1, no 14, 1981, p 89-94 5 refs

Experiments on insects, higher plants and lower fungi were carried out aboard the biological satellite Cosmos-1129, in earth orbit, from 25 September to 14 October 1979. The main objective of these experiments was to gain more profound knowledge of the effect of weightlessness on living organisms and to study the mechanisms by which these various organisms with different life cycles can adjust and develop in weightlessness. Experiments on insects (*Drosophila melanogaster*) were made with a view towards understanding gravitational preference in flies, the life cycle of which took place on board the biosatellite under conditions of artificial gravity. Experiments on higher plants (*Zea mays*, *Arabidopsis thaliana*, *Lycopersicon esculentum*) and lower fungi (*Physarum polycephalum*) were performed (Author)

A81-40368 **Space flight effects on *Paramecium tetraurelia* flown aboard Salyut 6 in the Cytos I and Cytos M experiments** H Panel, R Tixador, G Richoille, R Bassler, E Monrozies (Toulouse III, Université, Toulouse, France), Iu Nefedov, and G Gretchko (Ministerstvo Zdravookhraneniia SSSR, Institut Mediko-Biologicheskikh Problem, Moscow, USSR) (*COSPAR, Topical Meeting on Life Sciences and Space Research XIX, Budapest, Hungary, June 2-14, 1980*) *Advances in Space Research*, vol 1, no 14, 1981, p 95-100 9 refs

Results of the Cytos M experiment and complementary results of the Cytos I experiment flown aboard the Soviet orbital station Salyut 6 are shown. The space flight of *Paramecia* cultures resulted in a stimulating effect on cell proliferation, a larger cell volume, changes in cell dry weight, cell total protein and the electrolyte content of the culture media in which the organisms were grown. The assumption of a possible effect of weightlessness on membrane permeability is discussed (Author)

A81-40369 * **Circumnutation augmented in clinostatted plants by a tactile stimulus** D K Chapman and A H Brown (Pennsylvania, University, Philadelphia, PA) (*COSPAR, Topical Meeting on Life Sciences and Space Research XIX, Budapest, Hungary, June 2-14, 1980*) *Advances in Space Research*, vol 1, no 14, 1981, p 103-107 8 refs. Grants No NGR-39-010-149, No NGR-39-030-010, Contract No NAS9-15340

Dark-grown, 4-day old, *Helianthus annuus* seedlings were rotated for 20 hr on horizontal clinostats to minimize the amplitude of circumnutation. Then a Plexiglas sheet was placed gently against the tip of the cotyledons. By time-lapse video imaging (using intermittent IR illumination to which the plants were insensitive) movements of the clinostatted plants were observed before, during, and after the period of mechanical contact. Immediately after the Plexiglas sheet was removed residual nutation increased in amplitude almost three-fold, then declined over the next 7 hr to the prestimulation level. This demonstration of enhancement of circumnutation by mechanical contact is consistent with the model of an endogenous oscillator that can be stimulated by factors other than gravity (Author)

A81-40370 **Gravity as an obligatory factor in normal higher plant growth and development** A J Merkys, R S Laurinavichius, O Y Rupainene, D V Shvegzhene, and A V Yaroshius (Lithuanian Academy of Sciences, Institute of Botany, Vilnius, Lithuanian SSR) (*COSPAR, Topical Meeting on Life Sciences and Space Research XIX, Budapest, Hungary, June 2-14, 1980*) *Advances in Space Research*, vol 1, no 14, 1981, p 109-116 16 refs

A study of the influence of gravity on different aspects of plant activity is presented, with attention given to (1) gravity as an ecological factor determining spatial orientation of plant growth, and (2) a possible need for gravity during the process of normal growth, morphogenesis, and generative development of plants. Two approaches, i.e., ground-based experiments in clinostats and centrifuges, and experiments under conditions of dynamic weightlessness, are discussed. The investigations are divided into short-term experiments carried out in darkness on germinating seeds from various species, long-term experiments in light, covering the significant phases of plant development, and experiments performed with cell cultures and plant tissues. It is concluded that under terrestrial conditions, gravity is a necessary ecological factor determining the spatial orientation of both the roots and the part of the plant above ground. Changes in spatial orientation of the directed plant axis, with respect to the gravitational vector, cause decreased growth and disturbance in plant development. Experiments performed during space flights show that the initial growth phase of *Arabidopsis*, lettuce, pea, and wheat plants are essentially normal, however, further growth is affected adversely (Author)

A81-40371 * **Growth and development of cultured carrot cells and embryos under spaceflight conditions** A D Krikorian, F R Dutcher, C E Quinn, and F C Steward (New York, State University, Stony Brook, NY) (*COSPAR, Topical Meeting on Life Sciences and Space Research XIX, Budapest, Hungary, June 2-14, 1980*) *Advances in Space Research*, vol 1, no 14, 1981, p 117-127 6 refs. Contract No NAS2-10150, Grant No NSG-7270

Morphogenetically competent proembryonic cells and well-developed somatic embryos of carrot at two levels of organization were exposed for 18.5 days to a hypogravity environment aboard the Soviet Biosatellite Cosmos 1129. It was confirmed that cultured totipotent cells of carrot can give rise to embryos with well-developed roots and minimally developed shoots. It was also shown that the space hypogravity environment could support the further growth of already organized, later somatic embryonic stages and give rise to fully developed embryo-plantlets with roots and shoots (Author)

A81-40372 **Human adaptation to simulated gravitational fields** E B Shulzhenko, I F Vil-Viliams, and V E Panfilov (Ministerstvo Zdravookhraneniia SSSR, Institut Mediko-Biologicheskikh Problem, Moscow, USSR) (*COSPAR, Topical Meeting on Life Sciences and Space Research XIX, Budapest, Hungary, June 2-14, 1980*) *Advances in Space Research*, vol 1, no 14, 1981, p 131-134 12 refs

The results of manned studies in which test subjects were exposed to simulated zero g (water immersion or head-down tilt at -6 deg) and head-to-foot acceleration are presented. The findings give evidence that humans have different individual tolerances to an acceleration of +3 Gz after exposure to zero g, whether simulated by immersion or by head-down tilt. The paper discusses the functional relationship between water balance and cardiac output in the establishment of adaptive reactions to simulated zero g (Author)

A81-40373 **Measurement of the partial oxygen pressure and oxygen utilization in the skin of cosmonauts aboard Salyut 6** A Vacek, A Bartonickova, D Rotkova (Ceskoslovenska Akademie Ved, Biofizikalni Ustav, Brno, Czechoslovakia), E A Kovalenko, M P Bobrovnikskii (Ministerstvo Zdravookhraneniia SSSR, Institut Mediko-Biologicheskikh Problem, Moscow, USSR), Z Sarol (Wojskowy Instytut Medycyny Lotniczej, Warsaw, Poland), H Haase (Institute of Aviation Medicine, Konigsbruck, East Germany), and M Kovar (Research Institute of Medical Engineering, Brno, Czechoslovakia) (*COSPAR, Topical Meeting on Life Sciences and Space Research XIX, Budapest, Hungary, June 2-14, 1980*) *Advances in Space Research*, vol 1, no 14, 1981, p 141-148 11 refs

The oxygen tension (PO₂) in the dorsal skin surface of the forearm was studied during the stay of cosmonauts on board Salyut 6. Between the fourth and fifth day of stay on the orbital station a considerable reduction of the PO₂ level was observed. The oxygen utilization values were also reduced. In the early postflight period the low PO₂ level persisted, with gradual normalization (Author)

A81-40374 Changes in the microstructure of the vestibular apparatus of tadpoles (*Rana temporaria*) developed in simulated weightlessness J Neubert and W Briegleb (Deutsche Forschungs- und Versuchsanstalt für Luft- und Raumfahrt, Institut für Flugmedizin, Bonn, West Germany) (*COSPAR, Topical Meeting on Life Sciences and Space Research XIX, Budapest, Hungary, June 2-14, 1980*) *Advances in Space Research*, vol 1, no 14, 1981, p 151-157 12 refs

The vestibular apparatus of tadpoles (*Rana temporaria*) exposed to simulated weightlessness was examined by electron microscopy. Extended exposure to simulated weightlessness is followed by significant alterations in the sensory epithelia and also in the otolith membrane. Large vacuoles, filled with necrobiotic mitochondria and fragments of endoplasmic reticulum, were concentrated in the region where an otolith membrane covers the hair cells but were mostly absent in zones of the epithelia with undifferentiated cells. The number of otoconia in the otolith membrane was diminished. The results were compared with data from space flight experiments and some concordance was noted. The possible connection between some unusual behavior of the tadpoles after weightlessness simulation and the structural alterations in the gravitational sensors was discussed.

(Author)

A81-40375 Optical and electron-microscopic studies of the *Funaria hygrometrica* protonema after cultivation for 96 days in space E L Kordium, E M Nedukha, K M Stynik, and A L Mashinskii (Ukrainian Academy of Sciences, Institute of Botany, Kiev, Ukrainian SSR) (*COSPAR, Topical Meeting on Life Sciences and Space Research XIX, Budapest, Hungary, June 2-14, 1980*) *Advances in Space Research*, vol 1, no 14, 1981, p 159-162 13 refs

Funaria hygrometrica protonema cells grown in the 'IFS-2' (Inoculating fixing system) for 96 days on board the Salyut 6 - Soyuz 32 orbital scientific station were examined by light and electron-microscopy. Investigation of experimental and control cells of the moss protonema showed common features as well as distinctions in their structure. Protonema cells of *Funaria hygrometrica* both differentiate and undergo photosynthesis during space flight. Changes in cell shape, decreased cell size, a reduction in the volume of starch granules, and altered chloroplast structure were observed.

(Author)

A81-40376 The role of weightlessness in the genetic damage from preflight gamma-irradiation of organisms in experiments aboard the Salyut 6 orbital station E N Vaulina, I D Anikeeva, L N Kostina, I G Kogan, L R Palmbakh, and A L Mashinskii (Akademiia Nauk SSSR, Institut Obshchei Genetiki, Moscow, USSR) (*COSPAR, Topical Meeting on Life Sciences and Space Research XIX, Budapest, Hungary, June 2-14, 1980*) *Advances in Space Research*, vol 1, no 14, 1981, p 163-169 16 refs

A81-40377 On different sensitivities of microorganisms to lowered gravitation A A Imshenetskii, L A Kuziurina, V M Iakshina, and I K Dorofeeva (Akademiia Nauk SSSR, Institut Mikrobiologii, Moscow, USSR) (*COSPAR, Topical Meeting on Life Sciences and Space Research XIX, Budapest, Hungary, June 2-14, 1980*) *Advances in Space Research*, vol 1, no 14, 1981, p 173-177 7 refs

The influence of lowered gravitation on biomass and CO₂ production in *Bacillus megaterium*, a xerophyte, and *Spirillum azotocolligens*, an aqueous spirillum, in liquid nutrient medium on a horizontal clinostat at 0.1 g has been studied. As controls were considered (1) growth under stationary conditions of cultivation with test tubes oriented horizontally, (2) growth on a synchronously revolving centrifuge, and (3) growth on a swing with stirring. A horizontal clinostat at 0.1 g stimulates biomass production and CO₂ release in *B. megaterium* as compared with the controls. *S. azotocolligens* growth is reduced as a result of clinostatting. The best development and CO₂ production are observed under stationary conditions. The results do not support the assumption that microorganisms living in water are more resistant to lowered gravitation than those living in soil.

(Author)

A81-40378 The action of simulated and true weightlessness on the digestive tract of rats P Groza, A Bordeianu, S Cananau, A Boca, A Petrescu, and D Lungu (Academia de Stiinte Medicale, Institutul de Fiziologie Normala si Patologica, Bucharest, Rumania) (*COSPAR, Topical Meeting on Life Sciences and Space Research XIX, Budapest, Hungary, June 2-14, 1980*) *Advances in Space Research*, vol 1, no 14, 1981, p 179-185 7 refs

Rats on board the Soviet Cosmos 936 satellite for 18-1/2 days showed a decreased glycoprotein secretion from the salivary mucous glands, stomach and intestine, and an increased leucine aminopeptidase and acid phosphatase content from the small intestine. Grimelius positive cells were activated. One group of rats were centrifuged at 1 g during the flight to simulate terrestrial gravity. Some investigations have suggested that under these conditions muscular and cardiac disorders diminished. In the digestive tract the benefits of centrifugation at 1 g are minimal and limited to a few glycoprotein components. The digestive changes are probably the expression of a stress response, unrelated to weightlessness. Similar changes, concomitant with a glycocorticoid hypersecretion, were found in rats after 15 days of hypokinesia on earth. These digestive changes persisted even in adrenalectomized rats.

(Author)

A81-40379 Activity of the sympathetic-adrenomedullary system in rats after space flight on the Cosmos biosatellites R Kvetnansky, M Vigas, S Nemeth, L Macho (Slovenska Akademie Vied, Ustav Experimentalnej Endokrinologie, Bratislava, Czechoslovakia), and R A Tigranian (Ministerstvo Zdravookhraneniia SSSR, Institut Mediko-Biologicheskikh Problem, Moscow, USSR) (*COSPAR, Topical Meeting on Life Sciences and Space Research XIX, Budapest, Hungary, June 2-14, 1980*) *Advances in Space Research*, vol 1, no 14, 1981, p 187-192 16 refs

Indicators of adrenomedullary activity (catecholamine content (CA) and the activity of the catecholamine-synthesizing enzymes tyrosine hydroxylase (TH) and dopamine beta-hydroxylase (DBH)) were measured in the adrenal glands of rats living in a state of weightlessness for 18.5-19.5 days on board the biosatellites Cosmos 936 and Cosmos 1129. None of these indicators was significantly changed by space flight, neither in the group living in a state of weightlessness nor in the group living in a centrifuge on board the spacecraft and exposed to artificial gravity of 1 g (Cosmos 936).

Animals exposed after space flight to repeated immobilization stress on earth showed a significant decrease of adrenal adrenaline and an appreciable increase in adrenal TH activity compared to stressed animals which were not in space. These results suggest that a prolonged state of weightlessness during space flight does not by itself represent an intensive stressful stimulus for the adrenomedullary system but potentiates the response of cosmonauts to stress after return to earth.

(Author)

A81-40380 The effect of artificial gravity on plasma and tissue lipids in rats - The Cosmos 936 experiment I Ahlers, M Praslicka (Univerzita Pavla Jozefa Safarika, Kosice, Czechoslovakia), and R A Tigranian (Ministerstvo Zdravookhraneniia SSSR, Institut Mediko-Biologicheskikh Problem, Moscow, USSR) (*COSPAR, Topical Meeting on Life Sciences and Space Research XIX, Budapest, Hungary, June 2-14, 1980*) *Advances in Space Research*, vol 1, no 14, 1981, p 193-198 8 refs

Plasma and tissue lipids in male SPS Wistar rats flown for 18.5 days aboard the Cosmos 936 biosatellite were analyzed. One group of rats was subjected to artificial gravity by use of a centrifuge during the flight. An experiment simulating known space flight factors other than weightlessness was done on earth. An increase of total cholesterol in plasma, of nonesterified fatty acids in plasma and brown adipose tissue, of triacylglycerols in plasma, liver, thymus and bone marrow was noted several hours after biosatellite landing. Smaller changes were observed in the terrestrial control experiment. With the exception of triacylglycerol accumulation in bone marrow, these increases disappeared 25 days after biosatellite landing. Exposing the rats aboard the biosatellite to artificial gravity was beneficial in the sense that such exposure inhibited the phospholipid and triacylglycerol increase in plasma and inhibited the increase of triacylglycerol in liver and especially in bone marrow.

(Author)

A81-40381 * The effects of space flight on some rat liver enzymes regulating carbohydrate and lipid metabolism S Abraham, C Y Lin (Children's Hospital Medical Center, Bruce Lyon Memorial Research Laboratory, Oakland, CA), H P Klein, and C Volkmann (NASA, Ames Research Center, Moffett Field, CA) (*COSPAR, Topical Meeting on Life Sciences and Space Research XIX, Budapest, Hungary, June 2-14, 1980*) *Advances in Space Research*, vol 1, no 14, 1981, p 199-217 42 refs Contract No NAS2-9523

The effects of space flight conditions on the activities of certain enzymes regulating carbohydrate and lipid metabolism in rat liver are investigated in an attempt to account for the losses in body weight observed during space flight despite preflight caloric consumption. Liver samples were analyzed for the activities of 32 cytosolic and microsomal enzymes as well as hepatic glycogen and individual fatty acid levels for ground control rats and rats flown on board the Cosmos 936 biosatellite under normal space flight conditions and in centrifuges which were sacrificed upon recovery or 25 days after recovery. Significant decreases in the activities of glycogen phosphorylase, alpha-glycerol phosphate acyl transferase, diglyceride acyl transferase, aconitase and 6-phosphogluconate dehydrogenase and an increase in palmitoyl CoA desaturase are found in the flight stationary relative to the flight centrifuged rats upon recovery, with all enzymes showing alterations returning to normal values 25 days postflight. The flight stationary group is also observed to be characterized by more than twice the amount of liver glycogen of the flight centrifuged group as well as a significant increase in the ratio of palmitic to palmitoleic acid. Results thus indicate metabolic changes which may be involved in the mechanism of weight loss during weightlessness, and demonstrate the equivalence of centrifugation during space flight to terrestrial gravity. A L W

A81-40382 Metabolic changes in rats subjected to space flight for 18.5 days in the biosatellite Cosmos 936 S Nemeth, L Macho, M Palkovic, N Skottova (Slovenska Akademie Vied, Ustav Experimentalnej Endokrinologie, Bratislava, Czechoslovakia), and R A Tigranian (Ministerstvo Zdravookhraneniia SSSR, Institut Mediko-Biologicheskikh Problem, Moscow, USSR) (*COSPAR, Topical Meeting on Life Sciences and Space Research XIX, Budapest, Hungary, June 2-14, 1980*) *Advances in Space Research*, vol 1, no 14, 1981, p 219-224 17 refs

From an investigation of the activity of six glucocorticoid dependent liver enzymes, the existence of chronic, transient, stress-induced hypercorticoesteronaemia during flight is probable. This hypercorticoesteronaemia arises from weightlessness and induces gluconeogenesis. Weightlessness also caused substantial increases in liver glycogen level. The increased lipolytic activity and that of lipoprotein lipase in several groups of animals could be interpreted as enhancement of fat mobilization and utilization under the influence of stress. As this latter enhancement was also found in ground based controls, it may have been due to the stress of handling rather than to space flight per se. (Author)

A81-40383 Changes of deoxyribonucleoprotein in the spleen, thymus and liver of rats exposed to weightlessness and artificial gravity aboard the Cosmos biosatellites E Misurova, M Praslicka (Univerzita Pavla Josefa Safarika, Kosice, Czechoslovakia), and R A Tigranian (Ministerstvo Zdravookhraneniia SSSR, Institut Mediko-Biologicheskikh Problem, Moscow, USSR) (*COSPAR, Topical Meeting on Life Sciences and Space Research XIX, Budapest, Hungary, June 2-14, 1980*) *Advances in Space Research*, vol 1, no 14, 1981, p 225-230 12 refs

A81-40613 Biological rhythms (Biologicheskie ritmy) Edited by V N Chernigovskii. Moscow, Izdatel'stvo Nauka (Problemy Kosmicheskoi Biologii. Volume 41), 1980 320 p. In Russian.

The rhythms arising on all levels of biological organization are discussed together with their connection with the natural periodicity of the earth environment in light of the significance of biological rhythms for the maintenance of life in space. The biological rhythms observed on the cellular, organismal and populational levels are surveyed, with attention given to the temporal organization of biological systems, the rhythmic regulation of physiological functions, rhythms in animal growth and development, and periodic variations in animal population levels. Biological rhythms connected with periodicities in the environment are then examined, including

diurnal, lunar, multiday and seasonal rhythms and biological rhythms associated with the solar activity cycle. A L W

A81-40624 # Pilot outfit (Snariazhenie letchika) S P Umanskiy. Moscow, Voenizdat, 1980 120 p. 21 refs. In Russian.

The book contains a description of flying suits, anti-g equipment, footwear, helmets, and heating and cooling devices. Materials used, and also heat transfer and other physical processes involved in the interaction between the flier and his outfit are briefly discussed. V L

A81-40628 # The cardiac cycle (Serdechnyi tsikl) V A Frolov, E V Bogdanova, and T A Kazanskaia. Moscow, Izdatel'stvo Moskovskogo Universiteta, 1981 136 p. 124 refs. In Russian.

The book treats the electrophysiological, metabolic and ultrastructural processes of the cardiac cycle. Changes in myocardial excitability over the course of a cardiac cycle are examined, and experimental results concerning variations in myocardial energy metabolism during a single cycle are presented. Cyclic variations in several myocardial ultrastructures are considered, and the role of diastole in maintaining the contractile functioning of the heart is discussed. Finally, the dynamics of the cardiac cycle is examined, with particular attention given to myocardial metabolism, electrophysiology, characteristics of the diastolic pauses, myocardial lability, and typical pathological characteristics. A L W

A81-40695 # The mechanism of otolithic nystagmus (O mekhanizme otolitovogo nistagma) Iu K Stolbkov (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR) *Fiziologicheskii Zhurnal SSSR*, vol 67, May 1981, p 732-737 13 refs. In Russian.

The occurrence of otolithic nystagmus during rotation is investigated in a study of the mechanism of nystagmus induced by otolith stimulation. Cervical nystagmus was recorded in 10 pigeons during symmetrical rotation in the horizontal plane in the head-up and head-down positions about an axis passing between the labyrinth organs, and during eccentric rotation in the head-in and head-out positions before and after the unilateral and bilateral severing of the saccular nerve. It is found that otolithic nystagmus arises only in the case of asymmetrical variations in afferent flux from the vestibular receptors of the left and right labyrinth, and only when this asymmetry reaches a critical level. A L W

A81-40696 # The role of M- and N-cholinergic brain systems in the mechanisms of optokinetic, nystagmus, optokinetic after-nystagmus and reverse optokinetic after-nystagmus (Rol' M- i N-kholinergicheskikh biosistem mozga v mekhanizmax formirovaniia optokinematicheskogo postoptokineticeskogo i reversivnogo postoptokineticeskogo nistagmov) V P Neverov (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR) and N A Losev (Akademiia Meditsinskikh Nauk SSSR, Leningrad, USSR) *Fiziologicheskii Zhurnal SSSR*, vol 67, May 1981, p 738-743 16 refs. In Russian.

A81-40753 Stress and its effect on airline safety J M Ramsden (Orient Airlines Association, Makati, Philippines) *Flight International*, vol 120, July 18, 1981, p 179-182.

Last minute flight changes and the captain's diminishing authority were among the sources of airline crewmember stress as discussed at an Orient Airlines Association safety seminar. Other sources of stress and safety hazards were inefficient direct-speech circuits between adjacent ATC centers, labor disputes causing delays and airspace closures, and noise curfews. In addition, sophisticated computers have records of errors; crewmembers must use different units of measure, and near misses are numerous. Economic factors (fuel savings) tend to be the leading cause of stress and safety hazards, with pilots forced to fly defective planes. Current handling of stress by smoking, drugs, alcohol was found unacceptable, while 'autogenic' training for stress relief has shown evidence of effectiveness. Included in the recommendations for safety responsibility are the fact that competitive pressures should not interfere with safety information exchange and carriers and professionals are in the best position to identify pitfalls. D L G

STAR ENTRIES

N81-26694 California Univ Los Angeles
EVALUATION OF HUMAN POWER CAPACITY THROUGH OLYMPIC WEIGHTLIFTING ANALYSES Ph D Thesis
 John Joseph Garhammer Jr 1980 101 p
 Avail Univ Microfilms Order No 8111224

Magnitudes of human output for various phases of the competitive lifting movements were studied. The power capacity exhibited consistencies associated with the corresponding movement speeds related to the classical force velocity (F-V) relationship for skeletal muscle. Energy flow analysis of olympic lifting movements indicates the primary importance of leg and hip musculature as is the case for jumping. The concept of stored elastic energy was utilized to explain the high power output for the relatively slow jerk thrust movement. It was found that in addition to training one reason for the near maximal power outputs of olympic lifters is the utilization of previously stored elastic energy. Dissert Abstr

N81-26695 Kansas Univ Lawrence
THE CONTROL OF BRAIN BLOOD FLOW DURING VARIOUS BLOOD OXYGEN LEVELS Ph D Thesis
 Lonni Craig Wagerle 1980 120 p
 Avail Univ Microfilms Order No 8111759

The vascular response of the brain to alterations in arterial blood oxygen tension (PaO₂) was investigated in unanesthetized ponies. The use of internal carotid artery flow was validated as a representative sample of brain blood flow during rest and during hypoxia. The transient and steady state cerebrovascular responses to three levels of isocapnic hypoxia and to one level of hyperoxia were determined. Internal carotid artery blood flow increased and internal carotid artery peripheral resistance decreased rapidly during the 2 to 3 minutes of hyperoxia and coincided with a transient increase in arterial PCO₂. After this initial increase, arterial PCO₂ was restored to isocapnic levels and internal carotid blood flow decreased slightly, internal carotid peripheral resistance increased from control. These data indicate that steady state isocapnic hyperoxia causes slight cerebral vasoconstriction. Dissert Abstr

N81-26696 Brown Univ Providence R I
LIGHT ADAPTATION AND LATERAL INHIBITION IN THE VERTEBRATE RETINA Ph D Thesis
 Jaime Alberto Castano 1980 178 p refs
 Avail Univ Microfilms Order No 8111077

Light adaptation and lateral inhibition in the vertebrate retina are characterized in a concise way so as to make these properties amenable to modeling and then light adaptation and lateral inhibition are modeled simultaneously in the distal retina using known electrical properties of receptors and horizontal cells. The main purpose of the model is to examine possible mechanisms of light adaptation and lateral inhibition that would result from electrical properties of reception and horizontal cells. Computer simulation of the electrical response of the model shows properties that are also found in cell recordings: saturation, spatial summation and antagonistic center-surround receptive field organization. In the model lateral inhibition is a consequence of the resistance of the extracellular space in the receptor terminal invagination and the lateral inhibition effect is present in the potential of the invagination and of the horizontal terminals. Light adaptation on the other hand is a consequence of a slowly changing voltage-dependent membrane resistance in the receptor. Dissert Abstr

N81-26697* National Aeronautics and Space Administration
 Pasadena Office, Calif
SYSTEM FOR MOVING A PROBE TO FOLLOW MOVEMENTS OF TISSUE Patent Application

Cyril Feldstein (JPL, California Inst of Tech Pasadena) Thomas W Andrews (JPL, California Inst of Tech Pasadena) Donald W Crawford (JPL California Inst of Tech Pasadena) and Mark A Cole, inventors (to NASA) (JPL, California Inst of Tech Pasadena) Filed 15 May 1981 15 p
 (Contract NAS7-100)

(NASA-Case-NPO-15197-1 US-Patent-Appl-SN-263957) Avail NTIS HC A02/MF A01 CSDL 06B

An apparatus is described for moving a probe that engages moving living tissue such as a heart or an artery that is penetrated by the probe which moves the probe in synchronism with the tissue to maintain the probe at a constant location with respect to the tissue. The apparatus includes a servo positioner which moves a servo member to maintain a constant distance from a sensed object while applying very little force to the sensed object, and a follower having a stirrup at one end resting on a surface of the living tissue and another end carrying a sensed object adjacent to the servo member. NASA

N81-26698# Massachusetts Inst of Tech, Cambridge Artificial Intelligence Lab

INFERRING SHAPE FROM MOTION FIELDS

D D Hoffman Dec 1980 21 p refs

(Contract N00014-80-C-0505 Grant NSF MCS-79-23110)

(AD-A099150 AI-M-592) Avail NTIS HC A02/MF A01 CSDL 12/1

The human visual system has the ability to utilize motion information to infer the shapes of surfaces. More specifically, we are able to derive descriptions of rigidly rotating smooth surfaces entirely from the orthographic projection of the motions of their surface markings. A computational analysis of this ability is proposed based on a shape from motion proposition. This proposition states that given the first spatial derivatives of the orthographically projected velocity and acceleration fields of a rigidly rotating regular surface then the angular velocity and the surface normal at each visible point on that surface are uniquely determined up to a reflection. The computational analysis proceeds in three main steps. First it is shown that surface tilt and one component of the angular velocity may be obtained entirely from the first spatial derivatives of the velocity field. Second it is shown that surface slant and the remaining two components of the angular velocity are computable if the first spatial derivatives of the acceleration field are also given. Finally the problem of constructing a velocity field from the temporally changing optic array is briefly discussed. Author (GRA)

N81-26699# Advisory Group for Aerospace Research and Development Neuilly-Sur-Seine (France)

THE EFFECT OF LONG TERM THERAPEUTICS, PROPHYLAXIS AND SCREENING TECHNIQUES ON AIRCREW MEDICAL STANDARDS

C E Simpson ed (Ministry of Defense London) Mar 1981 147 p refs. In ENGLISH and FRENCH Conf held at Toronto, 15-19 Sep 1980

(AGARD-CP-310 ISBN-92-835-0288-4) Avail NTIS HC A07/MF A01

The effects of high stress missions on flight crew members is surveyed. Medical standards screening and selection of aircrews are described as well as epidemiology and medical treatment.

N81-26700# Institute of Aviation Medicine Oslo (Norway)
PHYSICAL FITNESS AND CARDIOVASCULAR CAPACITY AN EPIDEMIOLOGICAL PROGRAM

Kjell Myhre Egil Alnaes and Harald T Andersen. In AGARD The Effect of Long-Term Therap Prophylaxis and Screening Tech on Aircrew Med Standards Mar 1981 7 p refs

Avail NTIS HC A07/MF A01

A longitudinal survey was conducted of the way of living of all personnel with flying status in terms of diet, smoking and drinking habits and habitual physical activity, in addition to anthropometrical/physiological parameters such as weight, percentage of fat, maximal aerobic power, serum concentrations of triglycerides, total cholesterol and HDL cholesterol. This information is obtained from each subject during his periodical major medical examination at the Institute of Aviation Medicine, which is every sixth year when the subject is below 40 yrs of age otherwise every third year. This program is discussed. S F

N81-26701# Institute of Aviation Medicine Manching (West Germany)

CHANGES IN PHYSICAL FITNESS DUE TO VARIATIONS IN PHYSICAL ACTIVITY AND DIET

Harald T Andersen and Kjell Myhre /in AGARD The Effect of Long-Term Therap Prophylaxis and Screening Tech on Aircrew Med Standards Mar 1981 4 p refs

Avail, NTIS HC A07/MF A01

Physical deterioration in 122 young pilots and navigators of the Royal Norwegian Air Force was studied over the 5-year period 1972-1977. A net gain in body weight with no simultaneous increase in aerobic capacity was interpreted as an early but serious sign of physical degeneration. S F

N81-26702# School of Aerospace Medicine, Brooks AFB, Tex Crew Technology Div

PHYSIOLOGICAL CRITERIA RELATED TO G TOLERANCE IN COMBAT AIRCREW

James E Whinnery /in AGARD The Effect of Long-Term Therap Prophylaxis and Screening Tech on Aircrew Med Standards Mar 1981 14 p refs

Avail NTIS HC A07/MF A01

Initial studies measuring the +Gz tolerance of 59 USAF aircrewmembers undergoing aeromedical evaluation were made on the USAF School of Aerospace Medicine (USAFSAM) human centrifuge using a specific centrifuge stress medical evaluation protocol. Clinically measurable parameters were found to be associated with +Gz tolerance. In addition, the use of the centrifuge stress medical evaluation protocol to detect medically significant cardiac dysrhythmias was investigated. The types of dysrhythmias and their time of onset gave added insight into the physiologic response of man to +Gz stress. S F

N81-26703# Laboratoire de Medecine Aerospatiale Bretigny-sur-Orge (France)

THE EFFECTS OF ACCELERATION ON COMBAT PILOT PERFORMANCE [ACCELERATIONS ET APTITUDE DES PILOTES D'AVIONS DE COMBAT]

B Vettes, G Leguay (Hospital d'Instruction des Armees) H Viellefond (Hospital d'Instruction des Armees) A Seigneure and R Auffret /in AGARD The Effect of Long-Term Therap Prophylaxis and Screening Tech on Aircrew Med Standards Mar 1981 9 p In FRENCH

Avail NTIS HC A07/MF A01

The cardiovascular system is the target of the stress factors associated with flight in combat aircraft. Consequently, examination of the heart and vessels receives all the attention of the experts during physical fitness examinations of aircraft pilots on admission, and especially during their review visits. It is often useful to evaluate functional circulatory integrity during a standardized test which is reproducible of the cardiovascular stress undergone by the pilot. During the test, the principal cardiovascular parameters are recorded and the visual field evaluated. Televised observation and recorded conversation sheds light on the general behavior of the subject. Experience with a centrifuge provides indispensable supplementary information to the medical record. A R H

N81-26704# Aerospace Medical Research Labs, Wright-Patterson AFB Ohio Biochemical Protection Branch

EXPERIENCE WITH HIGHLY SELECTIVE SCREENING TECHNIQUES FOR ACCELERATION STRESS DUTY

Bernard F Hearon and James H Raddin /in AGARD The Effect of Long-Term Therap Prophylaxis and Screening Tech on Aircrew Med Standards Mar 1981 8 p refs

Avail NTIS HC A07/MF A01

Impact acceleration tests designed to medically screen flight crews for high stress missions were conducted with human volunteers. Facilities included the Vertical Deceleration Tower, the Horizontal Decelerator and the Impulse Accelerator sleds. Disqualifying defects are summarized. S F

N81-26705# Royal Air Force, High Wycombe (England)

MANAGEMENT OF UNFIT AIRCREW

M G P Fisher /in AGARD The Effect of Long-Term Therap Prophylaxis and Screening Tech on Aircrew Med Standards Mar 1981 6 p refs

Avail NTIS HC A07/MF A01

The implications of unfitness in aircrew due to illness or injury are examined. A general philosophy of care and management directed towards an early and successful return to flying status is suggested. The role of the Flight Surgeon is highlighted as an intermediary between the clinical specialist and the executive who is responsible for coordinating the evidence required for a rational assessment of the fitness of the man/women as a whole. Examples are given of an unusual case (chondro sarcoma) and of a common injury (ejection spinal fractures). Conditions which currently pose problems of assessment are discussed, hypertension, peptic ulcer, manic depressive psychosis and sarcoidosis. S F

N81-26706# Letterman Army Inst of Research, San Francisco, Calif Div of Biorheology

A SOLID-STATE DARK ADAPTOMETER THE LAIR DARK ADAPTOMETER

Harry Zwick, Peter A OMara Edwin S Beatrice Silmon L Biggs and Charles W VanSice /in AGARD The Effect of Long-Term Therap Prophylaxis and Screening Tech on Aircrew Med Standards Mar 1981 10 p refs

Avail NTIS HC A07/MF A01

The eye's ability to adjust from a very bright light to a very dim light environment is known as dark adaptation. A dark adaptometer was developed which is considerably less complicated than other dark adaptometers. Interface with a low cost microcomputer system allows clinical flexibility for routine military screening and research flexibility for investigators studying the role of dark adaptation in military tasks. The data presented validate the use of this device for such applications. S F

N81-26707# Institute of Aviation Medicine, Manching (West Germany)

SCREENING FOR NOISE INDUCED HEARING LOSS IN NORWEGIAN AIR FORCE

H M Borchgrevink /in AGARD The Effect of Long-Term Therap Prophylaxis and Screening Tech on Aircrew and Standards Mar 1981 4 p refs

Avail NTIS HC A07/MF A01

A hearing loss prophylaxis program for the Norwegian Armed Forces is detailed. The program includes (1) a central archive of noise level registrations for civil and military work situations, (2) the publishing and distribution of noise level measurements, risk criteria and recommended prophylactic initiatives to the various work places and (3) audiometry of personnel. S F

N81-26708# Aerospace Medical Research Labs Wright-Patterson AFB Ohio Aviation Vision Lab

PROPOSED NEW VISION STANDARDS FOR THE 1980'S AND BEYOND CONTRAST SENSITIVITY

Arthur P Ginsburg /in AGARD The Effect of Long-Term Therap Prophylaxis and Screening Tech on Aircrew Med Standards Mar 1981 15 p refs

Avail NTIS HC A07/MF A01

Data are presented that reveal individual differences in contrast sensitivity among normal observers that have definite implications for visual performance in operational environments. Since these differences in visual sensitivity can relate to detection and recognition ranges, these data can then be transformed into time to perform certain tasks and lead naturally towards visual standards being based on task performance under operational conditions. It is suggested that contrast sensitivity data be obtained in parallel with conventional vision tests to begin creating visual standards that relate to observer capability over the full range of operational environments. E D K

N81-26709# School of Aerospace Medicine, Brooks AFB, Tex Neuropsychiatry Branch

BIOFEEDBACK REHABILITATION OF AIRSICK AIRCREW

Richard A Levy, David R Jones and Erin H Carlson /in AGARD The Effect of Long-Term Therap Prophylaxis and Screening Tech on Aircrew Med Standards Mar 1981 4 p

Avail NTIS HC A07/MF A01

The current treatment program for airsickness is reported in detail, describing treatment method and results. This program is based on biofeedback relaxation training and physiological monitoring in a motion stimulus environment. Twenty aircrew disabled by chronic severe airsickness were treated and

followed Two of this group were subsequently grounded for reasons unrelated to motion sickness, 2 were deleted from UPT due to continued motion sickness, 1 was disqualified from back-of-aircraft radio operator duties due to motion sickness, and 15 were successfully returned to operational flying E D K

N81-26710# Institute of Aviation Medicine, Fliegehorst (West Germany) Dept of Aviation Psychology

PSYCHOLOGICAL THERAPY AND PREVENTION OF STRESS REACTIONS IN GERMAN MILITARY PILOTS

Reiner W Kemmler /In AGARD The Effect of Long-Term Therap., Prophylaxis and Screening Tech on Aircrew Med Standards Mar 1981 11 p refs

Avail NTIS HC A07/MF A01

The disturbances of 44 aviators of the German Military are described and documented. The people concerned were pilots and navigators involved in a psychological intervention and counselling program over a period from 1973 to 1979. The aim was flying rehabilitation. The somatic, psychic, and social symptoms are analyzed under the heading of modern stress conceptions. Psychological prevention methods are proposed in order to reach a better stress tolerance. With high probability, these procedures will modify the operational behavior patterns under extreme mission conditions helping to prevent disturbances of health and minimize flight safety risks E D K

N81-26711# Defence and Civil Inst of Environmental Medicine, Downsview (Ontario)

DETECTION OF DIAZEPAM AND DETERMINATION OF TIME OF INGESTION IN AIR ACCIDENT/INCIDENT INVESTIGATION

Linda J McBurney /In AGARD The Effect of Long-Term Therap., Prophylaxis and Screening Tech on Aircrew Med Standards Mar 1981 8 p refs

Avail NTIS HC A07/MF A01

The temporal excretion patterns of unchanged diazepam metabolites are studied to determine if there was a relationship between metabolite ratios and the time of ingestion. A clinical study was carried out using gas chromatography-mass spectrometry (GC/MS) to verify the presence of and to quantitate diazepam metabolites in the urine of human subjects after a single 10 mg dose E D K

N81-26712# Institute of Aviation Medicine, Manching (West Germany)

CARDIOVASCULAR RISK FACTORS IN THE PILOT POPULATION: A POLICY DISCUSSION

Egil Alnaes and Harold T Andersen /In AGARD The Effect of Long-Term Therap., Prophylaxis and Screening Tech on Aircrew Med Standards Mar 1981 5 p refs

Avail NTIS HC A07/MF A01

Several large scale prospective investigations have recently quantified the cardiovascular risk factor pattern in the Scandinavian male population. Since the small population in Norway is biologically and sociologically homogeneous, it is possible to (1) extrapolate from current epidemiological research in Scandinavia to the aircrew population, (2) perform periodic standardized/centralized medical examination and evaluations and (3) remain in close personal contact with each aircrew member throughout his total career. A risk profile will be established for each aircrew candidate at the point of training entry and monitored annually throughout his career. Among other medical information this will contain family history, cholesterol/HDL ratio, smoking habits, level of physical fitness, etc. Significant changes in any individual's risk factor profile will be a cause for personal counseling and/or minor modifications/restrictions in medical flight status E D K

N81-26713# Aerospace Medical Div Brooks AFB Tex
DETECTION OF CORONARY ARTERY DISEASE IN ASYMPTOMATIC AIRCREW MEMBERS WITH THALLIUM-201 SCINTIGRAPHY

Gregory S Uhl, Michael A Montgomery and George M McGranahan /In AGARD The Effect of Long Term Therap Prophylaxis and Screening Tech on Aircrew Med Standards Mar 1981 5 p refs

Avail NTIS HC A07/MF A01

Thallium-201 exercise myocardial perfusion scintigraphy was accomplished in 130 aircrew members prior to their undergoing

coronary angiography. Most were undergoing cardiac catheterization for an abnormal exercise response to treadmill testing. Of these, 22 men had arteriographic evidence of obstructive coronary disease of at least 50% narrowing in a single vessel. All had abnormal myocardial scintigrams. There were 12 other aviators who had minimal degrees of coronary artery disease with lesions less than 50% as the maximum degree of obstruction. Of these, 8 had abnormal thallium scans showing a perfusion defect in the area of the myocardium presumably supplied by the diseased coronary artery. Of the 96 men with normal angiograms, only 4 had abnormal myocardial scintigrams. An abnormal myocardial scintigram was often associated with significant obstructive disease. A normal scan accurately ruled out the presence of high grade obstructive lesions and missed only 4 cases of minimal coronary disease E D K

N81-26714# Hellenic Air Force Aeromedical Center, Athens (Greece)

PILOTS WITH CARDIOLOGICAL PROBLEMS: TEN YEAR FOLLOW UP

G B Masdrakis, C E Giannopoulos and N Kalogerakis /In AGARD The Effect of Long Term Therap Prophylaxis and Screening Tech on Aircrew Med Standards Mar 1981 6 p refs

Avail NTIS HC A07/MF A01

It is known that a number of flyers with cardiological problems, such as repolarization changes, conduction defects, rhythm abnormalities or hypertension, are maintained on flying status if the successive complete medical evaluation is normal. The follow-up of these flyers for an indefinite period of time is important because it gives the possibility to follow the physical history of cardiac abnormalities in a select group of subjects. The medical files of active airline pilots and Hellenic Air Force Flyers are reviewed in order to determine (1) how many are maintained on flying status although presenting cardiac abnormalities and (2) the evolution of these abnormalities E D K

N81-26715# Royal Air Force Hospital, Halton (England)
USE OF BETABLOCKADE IN THE TREATMENT OF AIRCREW WITH HYPERTENSION

J N C Cooke /In AGARD The Effect of Long Term Therap., Prophylaxis and Screening Tech on Aircrew Med Standards Mar 1981 5 p refs

Avail NTIS HC A07/MF A01

The use of drugs which blockade beta adrenergic receptors as a treatment for engine and ischaemic heart disease is reviewed. The reasons for using these drugs in the treatment of hypertension in flight crews are summarized. Side effects of betablocking agents are discussed in relation to pilot performance E D K

N81-26716# Institute of Aviation Medicine Fuerstenfeldbruck (West Germany)

INFLUENCE OF BETA BLOCKING ATENOLOL AND OTHER MEDICATION ON THE REACTION TIME OF THE VISUAL SYSTEM

D Harms, E Pachale, and D Nechvatal /In AGARD The Effect of Long Term Therap Prophylaxis and Screening Tech on Aircrew Med Standards Mar 1981 5 p refs

Avail NTIS HC A07/MF A01

Visual reaction time as a measure of vigilance and of the psychophysiological condition of subjects was determined after combined physical and mental stress to examine B-blocker influence. Using the technique of electrooculography, 40 subjects were measured in a double-blind cross over design after applications of placebo or 50 mg of atenolol (TENORMIN) for 3 days. Visual reaction time was defined as the time between display of a peripheral light signal and the start of the eye movement that shifts the direction of gaze from the reference point to the stimulus. The results of the study show that under these experimental conditions there is a positive effect of beta-blocker medication on vigilance. In order to prove the sensitivity of the test method in a preliminary study, the effects of the well described drugs fenetylin-hydrochlorid, diazepam, oxazepam and alcohol on visual reaction time were investigated E D K

N81-26717# Institute of Aviation Medicine Fuerstenfeldbruck (West Germany)

CONSIDERATIONS ON LONG TERM THERAPY OF HYPERTONIA, LIPOMETABOLIC DISORDERS AND STRUMA IN FLYING PERSONNEL

W Nissen and L Gall /in AGARD The Effect of Long Term Therap. Prophylaxis and Screening Tech on Aircrew Med Standards Mar 1981 9 p refs

Avail NTIS HC A07/MF A01

Long term drug therapy in flying personnel is thought to be necessary only in very few instances as illustrated in cases involving hypertension, hyperlipoproteinemia (HLP) and euthyroid struma in the pilot population Sound medical advice and guidance in cases of hypertension and HLP are considered more important than drug therapy Long term treatment of euthyroid struma with thyroid hormones is only practical in rare cases E D K

N81-26718* National Aeronautics and Space Administration Marshall Space Flight Center Huntsville, Ala

PNEUMATIC INFLATABLE END EFFECTOR Patent

Keith H Clark and James D Johnston inventors (to NASA) Issued 16 Jun 1981 4 p Filed 22 Sep 1978 Supersedes N78-32724 (16 - 23 p 2133)

(NASA-Case-MFS-23696-1 US-Patent-4 273,505

US-Patent-Appl-SN-945044 US-Patent-Class-414-735

US-Patent-Class-294-93, US-Patent-Class-414-4,

US-Patent-Class-414-744A) Avail US Patent and Trademark Office CSCL 131

The invention relates to an end effector device for robot or teleoperated type space vehicle which includes an inflatable balloon member carried on the end of tubular member which has a hollow center or conduit through which a suitable pressurized fluid is supplied The device may be inserted into a variety of shaped openings or truss-type structures for handling in space Official Gazette of the U S Patent and Trademark Office

N81-27775 Fordham Univ New York N Y

CONCENTRATION OF SELECTED TRACE METALS BY MARINE PHYTOPLANKTON Ph D Thesis

Arthur V Stiffey 1981 151 p

Avail Univ Microfilms Order No 8111320

Cultures of *Platymonas subcordiformis* Nitzschia closterum and *Dunaliella* sp grown in a chemically defined artificial sea water medium were exposed to two levels of cadmium iron lead and nickel for periods of 2 8 16 and 48 hours Metals were determined by flameless atomic absorption spectrophotometry Cadmium uptake was low with all genera tested Iron uptake was rapid and almost complete within 8 hours Lead uptake was rapid and reached maximum uptake at 8 hours diminishing at 48 hours Nickel uptake was quite low with all genera tested Dissert Abstr

N81-27776 British Library Lending Div Boston Spa (England) **INSTRUMENTAL ASSESSMENT OF SHARPNESS OF OUTLINE OF ZONES OF INHIBITION OF GROWTH OF TEST MICROORGANISMS DURING DIFFUSION OF ANTIBIOTICS IN INFECTED AGAR**

E M Bershtein Feb 1981 11 p refs Transl into ENGLISH of Antibiotika (Moscow) v 23 no 12 1978 p 1088-1094 (BLL-RTS-12497) Avail British Library Lending Div Boston Spa, England

The optimization of the IFO-451 recording microphotometer which measures optical densities of transparent objects in the study of zone of growth inhibition and edge sharpness was assessed The agar layer was placed on the stage of the microphotometer and the growth inhibition zone was located Microphotometers can be used to obtain objective quantitation evaluation zones of inhibition and their boundaries The characteristics are applicable as response functions when analytical methods are optimized by experimental mathematical methods It was found that in antibiotic analysis by diffusion method the changes in conditions of cultures have a significant effect on the obtained values E A K

N81-27777 British Library Lending Div Boston Spa (England) **PELAGIC GAMMARIDS OF THE TROPICAL PART OF THE PACIFIC OCEAN**

Ya A Birshstein and M E Vinogradov Mar 1981 7 p Transl into ENGLISH of Tr Inst Okeanol Akad Nauk SSSR v 34 1960 p 220-223 (BLL-RTS-12449A) Avail British Library Lending Div Boston Spa, England

Physical descriptions of two specimens of the family Eusiridae genus *Eusirus* Kroyer are given A 17 mm long specimen of

Eusirus bathybius Schellenberg found in the Bougainville trench and a 10 mm long specimen of *Eusirus fragilis* Birshstein and M Vinogradov sp n found in the Tonga trench are described Drawings of body parts are presented J D H

N81-27778* Utah Univ Salt Lake City Dept of Psychology

TO DEVELOP BEHAVIORAL TESTS OF VESTIBULAR FUNCTIONING IN THE WISTAR RAT Final Report, Dec 1978 - Nov 1980

Harold C Nielson Nov 1980 26 p refs

(Grant NsG-2350)

(NASA-CR-164537) Avail NTIS HC A03/MF A01 CSCL 06C

Two tests of vestibular functioning in the rat were developed The first test was the water maze In the water maze the rat does not have the normal proprioceptive feedback from its limbs to help it maintain its orientation and must rely primarily on the sensory input from its visual and vestibular systems By altering lighting conditions and visual cues the vestibular functioning without visual cues was assessed Whether there was visual compensation for some vestibular dysfunction was determined The second test measured vestibular functioning of the rat's behavior on a parallel swing In this test the rat's postural adjustments while swinging on the swing with the otoliths being stimulated were assessed Less success was achieved in developing the parallel swing as a test of vestibular functioning than with the water maze The major problem was incorrect initial assumptions of what the rat's probable behavior on the parallel swing would be S F

N81-27779* National Aeronautics and Space Administration, Washington D C

THE NATURE OF COMPENSATORY AND RESTORATIVE PROCESSES IN THE LIVERS OF ANIMALS IRRADIATED DURING HYPOKINESIA

I P Chernov and L V Trusova Jul 1981 11 p refs Transl into ENGLISH from Med Radiol (USSR) v 24 no 4 Apr 1979 p 42-47 Transl by Kanner (Leo) Associates Redwood City Calif Original language doc prep by Paylov Medical Inst Ryazan (USSR)

(Contract NASw-3199)

(NASA-TM-76513) Copyright HC A02/MF A01 CSCL 06R

The nature of postirradiation repair in the livers of rats irradiated during hypokinesia is investigated Hepatocyte population counts mitotic activity binuclear cell content and karyometric studies were done to ascertain the effects of combined hypokinesia and radiation Hypokinesia is shown to change the nature and rate of post-irradiation changes in the liver the effect varying with the timing of irradiation relative to the length of hypokinesia It is concluded that the changes in the compensatory and restorative processes are caused by stress developed in response to isolation and restricted mobility By changing neuroendocrine system activity the stress stimulates cell and tissue repair mechanisms at a certain stage essential to the body's reaction of subsequent irradiation J D H

N81-27780* National Aeronautics and Space Administration Washington D C

REACTION BY THE RAT HYPOTHALAMUS-HYPOPHYSEAL SYSTEM TO STRESS FROM IMMOBILIZATION

B Gajkowska A Luciani, and J Borowicz Jul 1981 25 p refs Transl by Kanner (Leo) Associates Redwood City, Calif Original doc prep by Polish Academy of Sciences

(Contract NASw-3199)

(NASA-TM-76514) Avail NTIS HC A02/MF A01 CSCL 06S

Cytophysical changes in the ultrastructure of the neurosecretory hypothalamus under conditions of total short term immobility and partial long term immobility are investigated Electron microscope morphological studies revealed a stimulatory response of the hypothalamus hypophyseal system of the rat brain to stress produced by immobilization Total immobilization for two days resulted in changes in the neurons of the supraoptical and paraventricular nuclei and in the fibers of the neurohypophysis indicating an increased production of neurosecretory granules their rapid flow and enhanced secretion to the blood Partial immobilization of the animals for 3 weeks produced changes of a somewhat different character and of weaker intensity which may be considered as a manifestation of the adaptation of the

system and of the whole organism to the changed condition
J D H

N81-27781* National Aeronautics and Space Administration
Washington D C
**STUDY OF CATECHOLAMINE EXCRETION DURING
VIBRATION SICKNESS**

K Nedelcheva V Kirkov, I Khadzhiyeva and R Trendafilova
Feb 1981 9 p refs Transl into ENGLISH from Gig Tr Prof
Zabol (USSR) no 3 1976 p 49-51 Transl by Scientific
Translations Service Santa Barbara Calif Original doc prep
by Inst of Transportation Medicine Center of Hygiene (Sofia)
(Contract NASw-3198)
(NASA-TM-76548) Copyright Avail Issuing Activity CSCL
06S

The secretion of catecholamines (CA) during vibration sickness
was studied in ore miners The quantity of excreted CA in daily
urine was studied by spectrofluorometry for epinephrine (A)
norepinephrine (NA) Dopamine (DA) An increase in excreted
A NA and DA was observed The increase of CA excretion
and links of CA metabolism and the increase in the reserve
potentialities of the sympathetic system was noted Vibration
sickness caused by local vibration increased the activity of the
sympathetic adrenal system It is suggested that the excretion
of A NA DA should be considered in determining the degree
of vibration sickness E A K

N81-27782 Texas Woman's Univ Denton
**THE INFLUENCE OF PHYSICAL CONDITIONING AND
DECONDITIONING UPON CARDIAC STRUCTURE OF
MALES AND FEMALES** Ph D Thesis

Abdul-Rahman Saleh Al-Muhallani 1980 192 p
Avail Univ Microfilms Order No 8110509

The influence of 10 week conditioning and deconditioning
programs upon the cardiac structures of 20 college students
was measured by echocardiography A two-way analysis of
variance with repeated measures revealed that treadmill
performance time (TPT) IVS thickness PWT LVIDd LVIDs LVID3
LVIDs3 and SV significantly increased following conditioning
then significantly decreased following deconditioning programs
The data also showed that the male Ss had greater heart walls
and dimensions when compared to the female values

Dissert Abstr

N81-27783* National Aeronautics and Space Administration
Pasadena Office Calif
**MEDICAL DIAGNOSIS SYSTEM AND METHOD WITH
MULTISPECTRAL IMAGING** Patent

Victor J Anselmo (JPL California Inst of Technology Pasadena)
and Terrence H Reilly inventors (to NASA) (JPL California Inst
of Technology Pasadena) Issued 16 Oct 1979 10 p Filed
28 Nov 1977 Sponsored by NASA
(NASA-Case-NPO-14402-1 US-Patent-4 170 987
US-Patent-Appl-SN-855364 US-Patent-Class-128-665
US-Patent-Class-356-407 US-Patent-Class-356-406
US-Patent-Class-356-416) Avail US Patent and Trademark
Office CSCL 06B

A skin diagnosis system includes a scanning and optical
arrangement whereby light reflected from each incremental area
(pixel) of the skin is directed simultaneously to three separate
light filters, e.g IR red and green As a result the three devices
simultaneously produce three signals which are directly related
to the reflectance of light of different wavelengths from the
corresponding pixel These three signals for each pixel after
processing are used as inputs to one or more output devices to
produce a visual color display and/or a hard copy color print
for one usable as a diagnostic aid by a physician

Official Gazette of the U S Patent and Trademark Office

N81-27784 British Library Lending Div Boston Spa (England)
Article Translating Service

**A RESPIRATION APPARATUS FOR THE CLINICAL
DETERMINATION OF THE ENERGY TURNOVER IN MAN**
A Krogh Jan 1981 17 p refs Transl into ENGLISH from
Weiner Klin Wochenschr (West Germany) no 35 no 13 1922
p 290-293

(BLL-RTS-12030) Avail British Library Lending Div Boston
Spa England

A device which does not require gas analysis to determine
energy turnover in humans was designed The apparatus controls

whether oxygen uptake remains constant throughout the test
period The device consists of a recording spirometer which
provides a graphic respiration recording with an aluminum bell
An absorption container for carbon dioxide filled with wet coarse
grained soda lime is built into the spirometer It is shown that
oxygen consumption can be determined under this procedure
and is comparable to gas analytical methods E A K

N81-27785* Jet Propulsion Lab California Inst of Tech
Pasadena

**TOTAL HIP JOINT REPLACEMENT BIOTELEMETRY
SYSTEM**

J F Boreham R B Postal and R A Luntz 1 May 1981
76 p refs

(Contract NAS7-100)

(NASA-CR-164529 JPL-Pub-80-98)

Avail NTIS

HC A05/MF A01 CSCL 06B

The development of a biotelemetry system that is hermetic-
ally sealed within a total hip replacement implant is reported
The telemetry system transmits six channels of stress data to
reconstruct the major forces acting on the neck of the prosthesis
and uses an induction power coupling technique to eliminate
the need for internal batteries The activities associated with
the telemetry microminiaturization data recovery console
hardware fabrications power induction systems electrical and
mechanical testing and hermetic sealing test results are
discussed E A K

N81-27786* National Aeronautics and Space Administration
Lewis Research Center, Cleveland Ohio

**ION BEAM SPUTTER-ETCHED VENTRICULAR CATHETER
FOR HYDROCEPHALUS SHUNT** Patent Application

Bruce Banks inventor (to NASA) Filed 10 Jun 1981 11 p
(NASA-Case-LEW-13107-1 US-Patent-Appl-SN-272407) Avail
NTIS HC A02/MF A01 CSCL 06B

A cerebrospinal fluid shunt in the form of a ventricular catheter
for controlling the condition of hydrocephalus by relieving the
excessive cerebrospinal fluid pressure is described A method
for fabrication of the catheter and shunting the cerebral fluid
from the cerebral ventricles to other areas of the body is also
considered Shunt flow failure occurs if the ventricle collapses
due to improper valve function causing overdrainage The
ventricular catheter comprises a multiplicity of inlet microtu-
bules Each microtubule has both a large openings at its inlet
end and a multiplicity of microscopic openings along its lateral
surfaces The microtubules are perforated by an ion beam sputter
etch technique The holes are etched in microtubule by directing
an ion beam through an electro formed metal mesh mask producing
perforations NASA

N81-27787* National Aeronautics and Space Administration
Washington D C

**THE NEGATIVE EFFECT OF HYPOKINESIA INVOLVING
INJURY AND PREVENTIVE MEASURES**

Kh A Izakson Apr 1981 4 p Transl into ENGLISH of
Otritsatelnoye vliyaniye gipokinezii v svyazi s travmoy i Mery
Profilaktiki Tallin Voprosy Kurotolgii Fizioterapii i Lechebnoy
Fizicheskoy Kultury No 4 1978 p 81 Transl by Kanner
(Leo) Associates, Redwood City, Calif
(Contract NASw-3199)

(NASA-TM-76562) Avail NTIS HC A02/MF A01 CSCL
06P

The optimum length of bed rest for athletes suffering from
broken bones is considered Negative effects of hypokinesia
induced by bed rest include general weakness and deconditioning
of the muscles as well as sleeplessness headaches muscle pain
constipation unstable pulse and arterial pressure and changes
in reflexes This is considered to be the result of a vegetative
dysfunction induced by the decreased flow of nerve impulses
and a decrease in interoceptive and exteroceptive signals The
briefest possible period of bed rest followed by an increase in
motor activity the prescription of a large quantity of LFK and
an active program of physical therapy are recommended The
symptomatology associated with hypokinesia disappears after one
month of free motor activity J D H

N81-27788* Office of Technology Assessment Washington
D C

ASSESSMENT OF TECHNOLOGIES FOR DETERMINING

CANCER RISKS FROM THE ENVIRONMENT

Jun 1981 248 p refs
 Avail NTIS HC A11/MF A01

Exposures and behaviors related to cancer occurrence a first step in cancer prevention, are examined. The importance of environmental factors in cancer occurrence the laws that require actions to reduce exposures to cancer causing substances (carcinogens) were studied. The following topics are discussed: what is known about the occurrence of cancer and death from cancer in the United States; methods to identify cancer causing substances; exposures, and behaviors; methods to estimate the amount of cancer which may result from a particular behavior of exposure. Federal laws that provide for regulatory control of carcinogenic exposures and options for Congress. E A K

N81-27789# Argonne National Lab III

HEALTH EFFECTS OF SYNFUELS TECHNOLOGY A REVIEW

L P Sanathanan C A Reilly S A Marshall and K E Wilzbach
 Apr 1981 65 p refs
 (Contract W-31-109-eng-38)
 (ANL/ES-111) Avail NTIS HC A04/MF A01

Annotated synopses of information pertinent to health impacts of synthetic fuel technologies under development are presented. The focus is on carcinogenesis which appears to be a special problem with coal conversion technologies. This review is intended to serve as a reference for the NEPA Affairs Division of DOE in its evaluation of the overall synthetic fuel program and specific projects in the program. DOE

N81-27790# National Aerospace Lab Amsterdam (Netherlands)
 Flight Div

THRESHOLDS FOR THE VISUAL PERCEPTION OF POSITION DEVIATIONS AND MOTION

J Smit 24 Nov 1978 16 p refs
 (Contract NIVR-1857)
 (NLR-TR-79025-U) Avail NTIS HC A02/MF A01

The accuracy with which some relevant display elements are set during a visual approach to landing at a desired nominal position was determined in an experiment via the psychophysical method of adjustment. Subjects were required to perform a number of visual positioning tasks while viewing a scene representing a position (200 ft on a 3 deg glide slope) during a landing. Mean settings, means and standard deviations of the adjustment errors and root mean square values for the various configurations were obtained. Author (ESA)

N81-27791# Advisory Group for Aerospace Research and Development Neuilly-Sur-Seine (France)

TOXIC HAZARDS IN AVIATION

Apr 1981 131 p refs. In ENGLISH and FRENCH. Proc of conf held in Toronto 15-19 Sep 1980
 (AGARD-CP-309 ISBN-92-835-0291-4) Avail NTIS HC A07/MF A01

The aviation environment contains many toxic materials and products. With the evolution of more advanced aircraft propulsion mechanisms, specialized aircraft material development and associated maintenance activities, there is a major increase in the potential toxic hazards associated with these systems. The threat of toxic exposure covers the entire spectrum of low-level continuous or intermittent to high-level brief accidental or unavoidable exposures. However, the protection of the crew and passengers is not the only concern in dealing with the toxic hazards in aviation. Research in the biomedical aspects of occupational health and safety standards, toxic substances, environmental impact criteria and classification of transportation is highlighted.

N81-27792# Aerospace Medical Research Labs Wright-Patterson AFB Ohio Toxic Hazards Div

RAMJET FUEL TOXICOLOGY

Kenneth C Back. In AGARD Toxic Hazards in Aviation. Apr 1981 6 p refs
 Avail NTIS HC A07/MF A01

Fuels containing isomers of perhydromethylcyclopentadiene (RJ4) reduced dimers of bicycloheptadiene (RJ5) a tricyclodecane compound (JP10) and methylcyclohexane were studied for their acute, subacute and chronic toxicity. The agents are of low order toxicity from acute exposure. Chronic toxicity studies were run on RJ4 and JP10 using rats, mice, dogs and monkeys.

Kidney and liver hyperplasia in RJ4 exposed rats and pulmonary irritation in dogs and monkeys exposed to RJ4 and RJ5 emerge as the salient results. Although there is some indication of increased tumor incidence in a small number of mice held for one year after exposure to near saturated RJ5 vapors, there is no clear cut evidence that this compound is carcinogenic. T M

N81-27793# Naval Medical Research Inst Wright-Patterson AFB Ohio Toxicology Detachment

THE TOXICITY OF GRADE JP-5 AVIATION TURBINE FUEL, A COMPARISON BETWEEN PETROLEUM AND SHALE-DERIVED FUELS

Morris J Cowan Jr and Lawrence J Jenkins Jr (Shell Development Co Houston Tex). In AGARD Toxic Hazards in Aviation. Apr 1981 7 p refs

Avail NTIS HC A07/MF A01

In order to assess the suitability of shale-derived JP-5 it is important that its inherent toxicity be identified and that the comparative toxicity of both the shale and petroleum JP-5 be identified. As a liquid acute spill hazard the fuels were examined for ocular and dermal irritation potential and for skin sensitization potential. Since the fuel is a complex mixture of aliphatic and aromatic hydrocarbons each exhibiting different vapor pressures, the nature of any accidental inhalation exposure will be dependent on the concentration of low boiling components in the mixture. The fuels were examined as a vapor inhalation hazard by exposing animals continuously for 90 days to vapors as high as 750 mg/cu m. Groups of animals were examined at 90 days and at the end of their normal expected lifetime. The fuels were examined as a potential oncogen by histopathologic examination of the animals exposed for 90 days and held for a lifetime. T M

N81-27794# Ohio State Univ Columbus Dept of Veterinary Pathology

DIFFERENTIAL EFFECTS OF HYDRAZINE COMPOUNDS ON B- AND T-CELL IMMUNE FUNCTION

Melinda J Tarr and Richard G Olsen. In AGARD Toxic Hazards in Aviation. Apr 1981 7 p refs

(Contract F49620-79-C-0163)

Avail NTIS HC A07/MF A01

The immunotoxic effects of four hydrazine compounds were evaluated by adding them to lymphocytes in the lymphocyte blast transformation (LBT) assay. 1,1-dimethylhydrazine (UDMH) caused an enhancement of the LBT response of murine splenocytes to the B-cell mitogen lipopolysaccharide (LPS) at concentrations of 10-25 ppm. 1,2-dimethylhydrazine (SDMH) exerted an effect similar to that of UDMH when added to splenocytes in the LBT assay, causing an enhancement of the LBT response to LPS at low concentrations then a suppression at higher concentrations. The results suggest that UDMH and SDMH abrogate suppressor cell function and that Hz and MMH suppress T-cell function (cell-mediated immunity) more than B-cell function (humoral immunity). T M

N81-27795# California Univ Irvine Dept of Developmental and Cell Biology

HYDRAZINE EFFECTS ON VERTEBRATE CELLS IN VITRO

Ann E Siemens, Margarita C Kitzes and Michael W Berns. In AGARD Toxic Hazards in Aviation. Apr 1981 16 p refs. Submitted for publication.

(Contract AF-AFOSR-3136-77)

Avail NTIS HC A07/MF A01

Cells were exposed to hydrazine in various concentrations (0.001 mM to 10 mM) for varying time periods. The resulting growth and morphological data revealed a possible site of hydrazine action. In all cell lines tested, population growth was depressed by low concentration of hydrazine (0.01 mM to 0.1 mM). Cell growth was initially depressed but it eventually returned to normal log phase growth even when fresh hydrazine was added to the culture medium. At higher concentrations (0.5 mM to 2.0 mM) hydrazine was lethal. Most cell types first showed population growth depression at 0.01 mM hydrazine, but the lethal concentration varied with the cell type. Cultures treated with hydrazine yielded a significantly higher number of giant multinucleated cells. Autoradiography studies confirmed that the large multinucleated cells resulted from cell fusion. T M

N81-27796# Aerospace Medical Research Labs, Wright-Patterson AFB Ohio Toxic Hazards Div
THE ONCOGENIC HAZARD FROM CHRONIC INHALATION OF HYDRAZINE

Vernon L Carter Jr Kenneth C Back and James D MacEwen (California Univ, Irvine) *In* AGARD Toxic Hazards in Aviation Apr 1981 9 p refs

Avail NTIS HC A07/MF A01

Studies were therefore conducted to evaluate the long term effects of airborne hydrazine at levels near the present and proposed Threshold Limit Value concentrations. Repeated daily inhalation exposure to 5 parts per million (ppm) hydrazine induced nasal tumors in Fischer 344 male and female rats and in male Golden Syrian hamsters. Repeated exposure to 1 ppm also produced nasal turbinate tumors in rats and pulmonary adenomas in female C57B1/6 mice. The inhalation exposures to the rodents were conducted for 6 hours per day 5 days per week over a 12 month period. Rats and mice were held 18 months postexposure. The nasal turbinate tumor incidence in rats was dose related. No statistically significant tumorigenic effects occurred after repeated exposure to 0.05 and 0.25 ppm hydrazine concentrations which spanned the American Conference of Governmental Industrial Hygienists recommended Threshold Limit Value. T M

N81-27797# Ohio State Univ Columbus Dept of Veterinary Pathobiology

INHIBITION OF VIRUS TRANSFORMATION BY HIGH ENERGY FUELS AS A CORRELATE OF CARINOGENIC POTENTIAL

James R Blakeslee Jr *In* AGARD Toxic Hazards in Aviation Apr 1981 6 p refs

(Contracts F49620-77-C-0110 F49620-C-0087)

Avail NTIS HC A07/MF A01

Hydrazine and naphthylamines and their derivatives were assayed for co-carcinogenic effects on ST FeSV-directed transformation of human cells. All chemicals tested at non-toxic concentrations showed anti-carcinogenic activity. The temporal relationship of chemical treatment to virus infection was more critical with the hydrazines than with the naphthylamines in that maximum anti-carcinogenic effect occurred when virus-infected cells were exposed to the hydrazines 2 hrs post-infection whereas the naphthylamines anti-carcinogenic effect was observed if cells were exposed either pre- or post-infection. The anti-carcinogenic effect when compared with in vitro chemical transformation and neoplastic transformation show a high degree of correlation. These data suggest this assay system may lend itself to a rapid screen (9-13 days) of chemicals for carcinogenic potential. Cytotoxic results showed no significant difference in shale oil or petroleum derived JP5 or DFM. Author

N81-27798# Ohio State Univ, Columbus Dept of Physiological Chemistry

INTERTISSUE VARIATION IN BENZO(A)PYRENE METABOLISM BY HUMAN SKIN, LUNG AND LIVER IN VITRO

George E Milo Ronald W Trewyn Raman Tejwani James W Oldham and William H J Douglas (Tufts Univ Boston) *In* AGARD Toxic Hazards in Aviation Apr 1981 9 p refs

(Contract F49620-77-C-0110)

Avail NTIS HC A07/MF A01

Benzo(a)pyrene (B(a)P) an environmental carcinogen is shown to transform human skin fibroblasts in vitro. This fossil fuel combustion product and other polynuclear hydrocarbons have exhibited a requirement to be biotransformed to their ultimate carcinogenic forms to induce transformation. B(a)P diol-epoxides are the most cited candidates as ultimate carcinogens. Results suggest that either the ultimate form of the carcinogen is different for fibroblasts and epithelial cells or the quantitative generation of hydroxylated metabolites is not required for neoplastic transformation in fibroblast cells. If hydroxylation is required then the site of hydroxylation may be the significant factor. Present evidence suggests that in B(a)P treated fibroblasts the activation of B(a)P in the cell takes place other than the microsomal P450 complex presumably in the nucleus. T M

N81-27799# Laboratoire Central de Biologie Aerospatiale Paris (France) Div de Chimie-Toxicologie

THE TOXICITY OF GASES FROM THE THERMAL DECOMPOSITION OF COMBUSTIBLE MATERIALS. A TEST CHAMBER PROTOTYPE [TOXICITE DES GAZ DE DECOMPOSITION THERMIQUE DES MATIERES COMBUSTIBLES]

P E Picart J P Delcroix and M Guerbet *In* AGARD Toxic Hazards in Aviation Apr 1981 10 p refs *In* FRENCH

Avail NTIS HC A07/MF A01

When fire breaks out in a closed environment as in an aircraft cabin evacuation is not immediately possible and thus it is necessary to establish minimum survivable conditions. In this case toxic gases become a major problem. That is why it is necessary to select materials that present a minimum of toxicity in case of an onboard fire. A test chamber was developed that permits the examination of physical parameters involved with the thermal degradation of aircraft materials with emphasis on the toxicity of combustion gases. The test chamber is described and the results of tests run on three materials (wood polyurethane resins polyvinyl chloride) are presented. T M

N81-27800# Defence and Civil Inst of Environmental Medicine Downsview (Ontario)

ACUTE CARBON MONOXIDE POISONING

H D Madill and B J Gill *In* AGARD Toxic Hazards in Aviation Apr 1981 5 p refs

Avail NTIS HC A07/MF A01

The principal toxic action of carbon monoxide is accepted as being due to its combination with hemoglobin to form carboxyhemoglobin (COHb). This has the effect of diminishing the oxygen carrying capability of the blood as well as altering the oxygen dissociation characteristics of the remaining oxyhemoglobin. This fundamental action of carbon monoxide was utilized as an objective measure of the degree of exposure and resulting intoxication based upon the level of COHb produced. The relationship between variable physiological parameters such as diffusivity of the lung the ventilation rate and the affinity of blood for CO the CO concentration in inspired air and the exposure time provides a means of predicting COHb formation. T M

N81-27801# Laboratoire de Medecine Aerospatiale Bretigny-sur-Orge (France)

THE INFLUENCE OF ALTITUDE ON THE TOXICITY OF CARBON OXIDES [INFLUENCE DE L'ALTITUDE SUR LA TOXICITE DES OXYDES DE CARBONE]

H Vieillefond J L Poirer, and H Marotte *In* AGARD Toxic Hazards in Aviation Apr 1981 4 p refs *In* FRENCH

Avail NTIS HC A07/MF A01

The effects of the reduction of partial oxygen pressure on the toxicity of a mixture of carbon dioxide and carbon monoxide were examined. The degradation of psychomotor performance along with cardiovascular reactions were studied. Standards were established for carbon monoxide concentrations. T M

N81-27802# Aeronautical Systems Div Wright-Patterson AFB Ohio

IN-FLIGHT OXYGEN GENERATING EQUIPMENT

John P Allen *In* AGARD Toxic Hazards in Aviation Apr 1981 12 p refs

Avail NTIS HC A07/MF A01

On-board systems produce high oxygen concentrations of physiologically adequate oxygen for the aircrews. The quality of the oxygen is dependent on the quality of the input air and the provisions made for contaminant control. The molecular sieve material provides up to 95% oxygen with contaminant removal and separation from the oxygen product gas mixture. The chlorate candle oxygen generator produces almost 100% oxygen for 30 minutes and has effective adsorbents to remove contaminants from the oxygen produced. The fluomine system provides up to 98% oxygen in the product gas and uses activated carbon and molecular sieve filters for contaminant control. The concept with the greatest potential is the molecular sieve system using a specific type of sieve materials for oxygen concentration and effective contaminant control. Description of the systems are presented. T M

N81-27803# School of Aerospace Medicine Brooks AFB Tex
MOLECULAR SIEVE OXYGEN GENERATION SYSTEM, CONTAMINANT STUDIES

K G Ikels and J Ernsting *In* AGARD Toxic Hazards in Aviation Apr 1981 7 p refs

Avail NTIS HC A07/MF A01

The concept of inflight generation of breathing gas is attractive for military aircraft from the standpoint of logistics safety and cost. Evaluation and physiological assessment of the molecular sieve system in the laboratory is generally conducted with clean compressed air. In aircraft, however, the molecular sieve generator is supplied with engine bleed air which may not always be totally free of contaminants. Laboratory studies demonstrated that low molecular weight compounds pass through a molecular sieve bed into the breathing gas. The concentrations of the contaminants appearing in the output breathing gas are however much lower than that in the supply air and are shown to be directly related to the output demand flow of the oxygen generator. T M

N81-27804# Defence and Civil Inst of Environmental Medicine, Downsview (Ontario)

AIRSCAN AN ULTRASENSITIVE TRACE AIR IMPURITY ANALYZER FOR USE IN TOXIC AVIATION ENVIRONMENTS

R Leveson, N Barker, L Kuehn and H D Madill. In AGARD Toxic Hazards in Aviation Apr 1981 12 p refs. Prepared in cooperation with Photovac, Inc. Thornhill Ontario

Avail NTIS HC A07/MF A01

An advanced air analyzer is described that is capable of detecting a wide range of pollutants in ambient air at concentrations of well below 1 part-per-billion. The system employs a combination of photoionization detection with gas chromatography using air as the carrier gas. It is fully field portable and accepts a directly introduced sample of air without any need for time-consuming preconcentration procedures. Applications for the instrument include the monitoring of all manner of environments including those within aircraft and spacecraft as well as external environments which may be contaminated during fuelling operations or by accidental emissions from specialized ordnance. Hydrazine is of particular current relevance. Further applications include the monitoring of human exhaled breath in cases where there has been an unquantified exposure to toxic compounds. Such exposures are difficult to monitor at low levels, however the extreme sensitivity of the system makes it possible to detect breath metabolites in extremely concentrations. T M

N81-27805# Rouen Univ (France) Lab de Toxicologie
A LABORATORY MODEL FOR THE EVALUATION OF THE TOXICITY OF COMBUSTION PRODUCTS [MODELE DE LABORATOIRE POUR EVALUER LA TOXICITE DES PRODUITS DE COMBUSTION]

J M Jouany, J M Presles (DRET Paris) and J Pre (Paris XIII Univ Bobigny). In AGARD Toxic Hazards in Aviation Apr 1981 14 p refs. In FRENCH

Avail NTIS HC A07/MF A01

Criteria are established for the selection of aircraft compartment materials. The toxicity of the materials after undergoing thermal degradation was examined. A screening method is described which compares different biological effects with emphasis on respiration and oxygen metabolism. An index was developed to classify the materials. T M

N81-27806* National Aeronautics and Space Administration Langley Research Center Hampton Va

HELMET WEIGHT SIMULATOR Patent

Billy R Ashworth, Alton C Hall and Clyde E Clark inventors (to NASA). Issued 28 Apr 1981 4 p. Filed 30 May 1979. Supersedes N79-25761 (17 - 16 p 2179). (NASA-Case-LAR-12320-1 US-Patent-4 264 310 US-Patent-Appl-SN-043913 US-Patent-Class-434-59) Avail US Patent and Trademark Office CSDL 05H

A device for providing acceleration cues to the helmet of a simulator pilot is described. Pulleys are attached to both shoulders of the pilot. A cable is attached to both sides of the helmet and extends through the pulleys to a takeup reel that is controlled by a torque motor. Control signals are applied to a servo system including the torque motor, the takeup reel and a force transducer which supplies the feedback signal. In one embodiment of the invention the force transducer is in the cable and in another it is in the takeup reel.

Official Gazette of the U S Patent and Trademark Office

N81-27807* National Aeronautics and Space Administration, Washington D C

INVESTIGATION OF ACTUAL NUTRITION AND FOOD STATUS UNDER CONDITIONS OF LIMITED MOBILITY (HYPOKINESIA)

I G Popov and N D Radchenko. Apr 1981 13 p refs. Transl into ENGLISH from Gig i Sanit (USSR) no 12, 2 Mar 1976 p 26-32. Transl by Kanner (Leo) Associates Redwood City, Calif.

(Contract NASw-3199)

(NASA-TM-76563) Copyright Avail Issuing Activity CSDL 06P

A study of actual nutrition and food status of persons receiving a ration of 3155 and 2822 cal under conditions of hypokinesia with an average energy consumption of 2600 cal was undertaken. The second ration proved to be insufficient for some of the participants. It is suggested that a diet under hypokinesia conditions should include a 10 to 15 percent caloric ration reserve in addition to the energy consumption rate to satisfy the individual food and energy requirements. E A K

N81-27808# Federal Aviation Administration Washington D C Systems Research and Development Service

A SYSTEMS ENGINEERING EVALUATION METHOD FOR PILOTED AIRCRAFT AND OTHER MAN-OPERATED VEHICLES AND MACHINES WITH HYPOTHETICAL EXAMPLE OF A SYSTEMS EVALUATION AND QUANTIFIED SYSTEM PERFORMANCE-WORKLOAD RATING SCALES Final Report

Thomas H Higgins. Mar 1981 59 p refs.

(AD-A099196 FAA-RD-81-30)

HC A04/MF A01 CSDL 05/9

Avail NTIS

A systems evaluation method is presented which systematizes and quantifies both PRP pilot rating procedures and ECP engineering calculation procedure measures of system performance on a logarithmic ratio basis of test aircraft configurations compared to a known selected standard aircraft (vehicle) configuration. The logarithmic units 10 log (ECP test/ECP std) and 10 log (PRP test/PRP std) used in this system evaluation method are termed decivals dV as they are 10 times the log base 10 of the ratio of the ECP and PRP values obtained during tests for the test aircraft configuration compared to the chosen standard aircraft configuration. The system evaluation is for chosen time periods of selected flight operations which are critical to flight safety such as may occur during takeoff or approach to landing and may include emergency engine failure, flight control or instrument malfunction conditions. System equations are presented which answer the question as to how good is the test configuration in relation to the known standard configuration during these same flight conditions. Potential ECP measures are discussed and their correlation with PRP pilot ratings obtained during flight test or flight simulator test determines their retention as effective system performance and evaluation measures. The non-dimensional logarithmic nature of the retained ECP system performance descriptors allows their combination by logarithmic summation and their correlation with the PRP pilot ratings is determined. The combination of ECP measures having the highest correlation with pilot ratings is retained for final system evaluation. Author (GRA)

N81-27809# Dayton Univ Ohio

A MAN-MACHINE INTERFACE FOR ENERGY MONITORING AND CONTROL SYSTEMS Final Report, 1980 - 1981

Billy B Wise. Jun 1981 42 p refs.

(Contract F33615-77-C-2004)

(AD-A099884 CEL-CR-81 013)

HC A03/MF A01 CSDL 05/8

Avail NTIS

Energy monitoring and control systems (EMCS) man-machine interface (MMI) requirements are defined. Existing EMCS MMI are reviewed along with current MMI technology. Recommendations for an improved EMCS are made. Author (GRA)

N81-27810# US Divers Co, Santa Ana Calif Survair R and D Engineering Div

A 2 1/2 HOUR DURATION, CLOSED CIRCUIT LIFE SUPPORT SYSTEM REPORT INCLUDING TEST REPORT AND OUTLINE FOR NIOSH CERTIFICATION Final Report, 29 May 1980 - 31 Mar 1981

M L Kranz and M A Borrello. 31 Mar 1981 26 p refs. Prepared in cooperation with ILC Dover, Frederica Del. Prepared for Army Chemical Systems Lab.

(Contract DAAK11-80-C-0059)

(AD-A099763 ILC-0000-74288) Avail NTIS

HC A03/MF A01 CSDL 06/11

A self contained closed circuit breathing apparatus was developed for ILC Dover for the purpose of life support in a HCPCO (Hazardous Chemical Protective Clothing) Tests were performed to prove the design for life support compatibility over a duration period of 25 hours Peripheral functions of the system were also tested Recommendations were made from conclusive results Finally an outline was presented for submitting the system for NIOSH certification Author (GRA)

N81-27811# State Univ of New York at Buffalo Dept of Industrial Engineering

INDIVIDUAL DIFFERENCES IN DUAL-TASK PERFORMANCE Final Report, Mar 1978 - Jun 1980

Diane L Damos and Thomas E Smist Nov 1980 80 p refs (Contract N00203-78-M-3707 MF584002 ZF5852406)

(AD-A099977 NBDL-M006) Avail NTIS HC A05/MF A01 CSDL 05/1

Eleven right-handed males participated in an experiment examining individual differences in multiple-task performance Three task combinations were used in the study The first was composed of a memory task and a classification task The second consisted of two identical one-dimensional compensatory tracking tasks The third was a dichotic listening task On Day 1 of the experiment the subjects practiced each task alone On Days 2 3 and 4 they performed primarily under dual-task conditions However periodically dual-task practice was interrupted to reassess single-task performance All dual-task data were analyzed first to determine when stability occurred Each subject's stabilized data from the tracking-tracking and memory-classification combinations then were corrected for the appropriate single-task baseline Finally the subjects were grouped according to which of three response strategies they used to perform the memory-classification task combination These strategies were a massed strategy (in which the subject would emit a series of response to one task before responding to the other) an alternating responses strategy and a simultaneous response strategy A two-way repeated measures MANOVA conducted on the stabilized adjusted data indicated both a significant effect of trials and groups Possible sources of the between-group differences are discussed Author (GRA)

N81-27812# Research Inst of National Defence Stockholm (Sweden)

COLOR CODING OF DISPLAYS, MAPS AND IMAGES

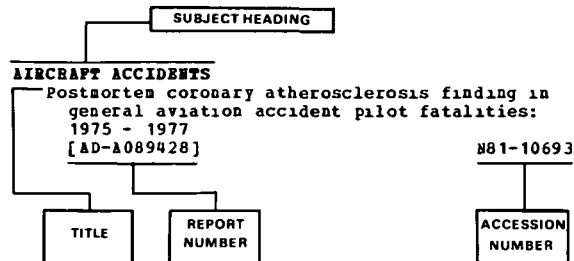
Gunilla Derfeldt Feb 1981 78 p refs

(FOA-C-53003-H9) Avail NTIS HC A05/MF A01

Color coding research is reviewed with respect to symbolic displays sonar data maps and pictures Color coding is discussed from a psychological point of view as a means of improving human performance in various visual tasks such as detection, search, identification, classification, and interpretation It is concluded that observers exhibit a general subjective preference for color presentations Provided the color code is well matched to the task at hand, color coding generally improves human performance Color used as a completely redundant code is always beneficial When used for symbol coding, color is disadvantageous compared to letters and digits for identifications Color coded symbols might interfere with identification and search for achromatic targets Author (ESA)

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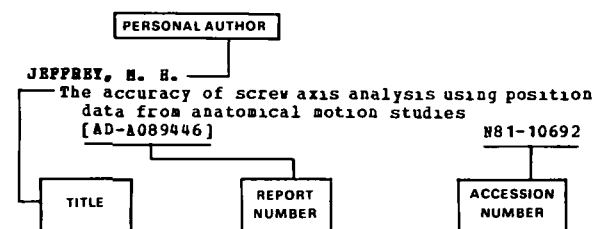
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